OCTOBER 8, 1956

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

Gases in Metals: The Unseen Culprits

Metallurgy Strives Harder To Keep Them Out . . . page 94

✔ Sales Large for Small Appliances . . . page 72

✔ Forgers Pound Out Second Best Year . . . page 135

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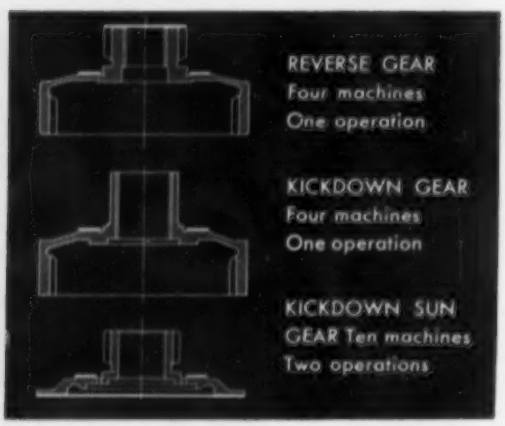
Heald VERSATILITY in action

How STANDARD Rotary Surface Grinders do a PRODUCTION-LINE JOB

Eighteen Model 261s surface grind 3 different automatic transmission parts on a high-production basis



PRODUCTION-LINE speed and tool-room precision go hand-in-hand on a Heald Model 261 Rotary. Its automatic features make it an ideal machine for long runs of identical parts. This is well illustrated by an 18-unit lineup of 261s in a fast-moving production line at a large automatic transmission plant. These *standard machines* are surface grinding the three different gears shown at the left. All 18 machines have 12" chucks and magnetic workholding is used for all but one of the operations. The number of machines used for each operation depends on grinding time per part and required hourly production. There are 15 *other* Model 261s in this same plant, doing both *production-line* and *tool-room* work.

Available as either a Plain or Automatic cycle machine, the Heald 261 easily meets every requirement for long or short run rotary surface grinding work. For complete information, send for Bulletin No. 2—261—2, Issue 3.

It PAYS to come to Heald.

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THE HEALD MACHINE COMPANY

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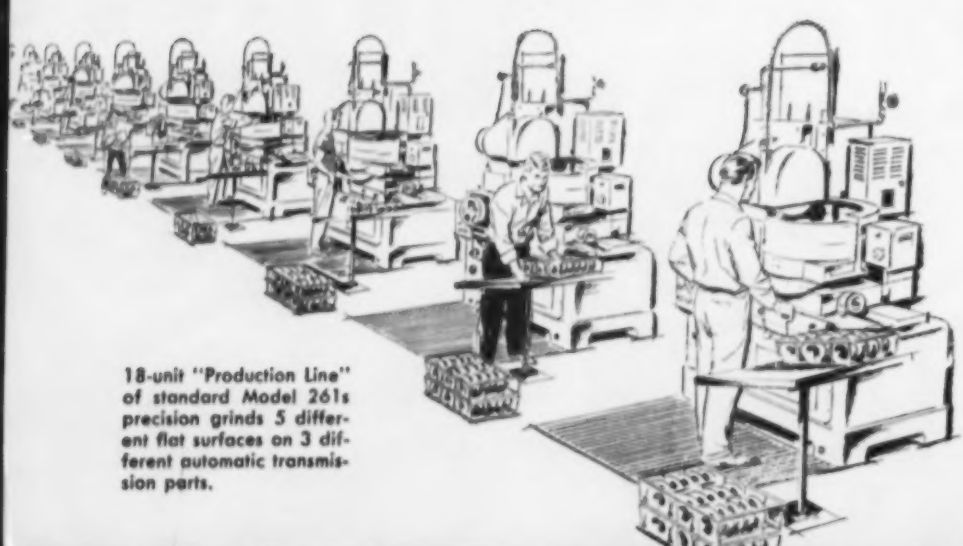
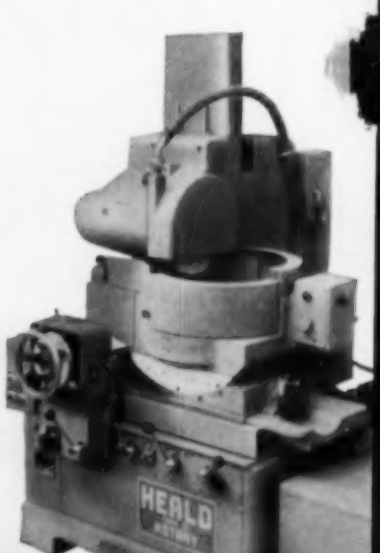


18-unit "Production Line" of standard Model 261s precision grinds 5 different flat surfaces on 3 different automatic transmission parts.



These eye-catching products are proof that steel wire can be prettied up. The candelabra and the wire dividers of the record "caddy" are finished in black bonderite, while the remaining items are plated with lustre-bright brass.

Handsome Housewares from Bethlehem Wire

These and other attractive housewares are made by Artistic Wire Products Co., Inc., East Hampton, Conn., from steel wire which we have been supplying for about nine years. A leading manufacturer of kitchen and houseware specialties, Artistic requires a wire having a surface suitable for spot-welding and plating.

Their multiple electro-welding machines call for wire with a minimum of surface irregularities. After welding, they finish the wire with black bonderite or with metal-plating, depending upon the product. Their "Vinylmaid" line of dish drainers and other specialties are coated with vinyl plastic in popular colors to match the modern kitchen.

A big part of our job is working closely with wire users, developing the best type of wire for each different application. Whether you need one of our special-purpose wires or one of the more ordinary types, you can count on our modern wire mills to do the kind of job that will keep your steel wire problems to a minimum.

Perhaps our wire-making experience can be of help to you right now. Just phone the nearest Bethlehem sales office or write to us at Bethlehem, Pa.

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BETHLEHEM, PA.

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BETHLEHEM STEEL

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NEW fatigue-proof STEEL BAR

..the bar that has HIGH STRENGTH without heat treating

Yes, La Salle invites you to test a sample bar of the remarkable new FATIGUE-PROOF. This amazing new material is its own best recommendation . . . as proven by the many original equipment manufacturers who have already tested (and are using) FATIGUE-PROOF.

If you are making parts requiring strengths in the tensile range of 140,000 to 150,000 psi, and want to eliminate the expense or problems of heat treating . . . if you want to save production costs with a bar that machines faster (25% faster than annealed alloys—50% to 100% faster than heat treated alloys) and gives you a beautiful finish, too . . . if you want to improve the quality of your product while saving money, send us a blueprint, drop us a note giving application details, or better yet . . . pick up your telephone and call a La Salle sales engineer (REgent 4-7800, Chicago, Illinois).

If it appears that FATIGUE-PROOF can help you improve your product and cut your cost, he will arrange to provide the necessary test sample at no expense to you.

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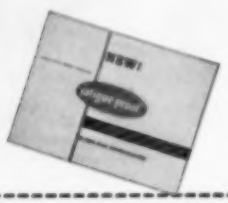
Get your copy of this 20-page booklet which gives detailed information on the remarkable new "FATIGUE-PROOF."



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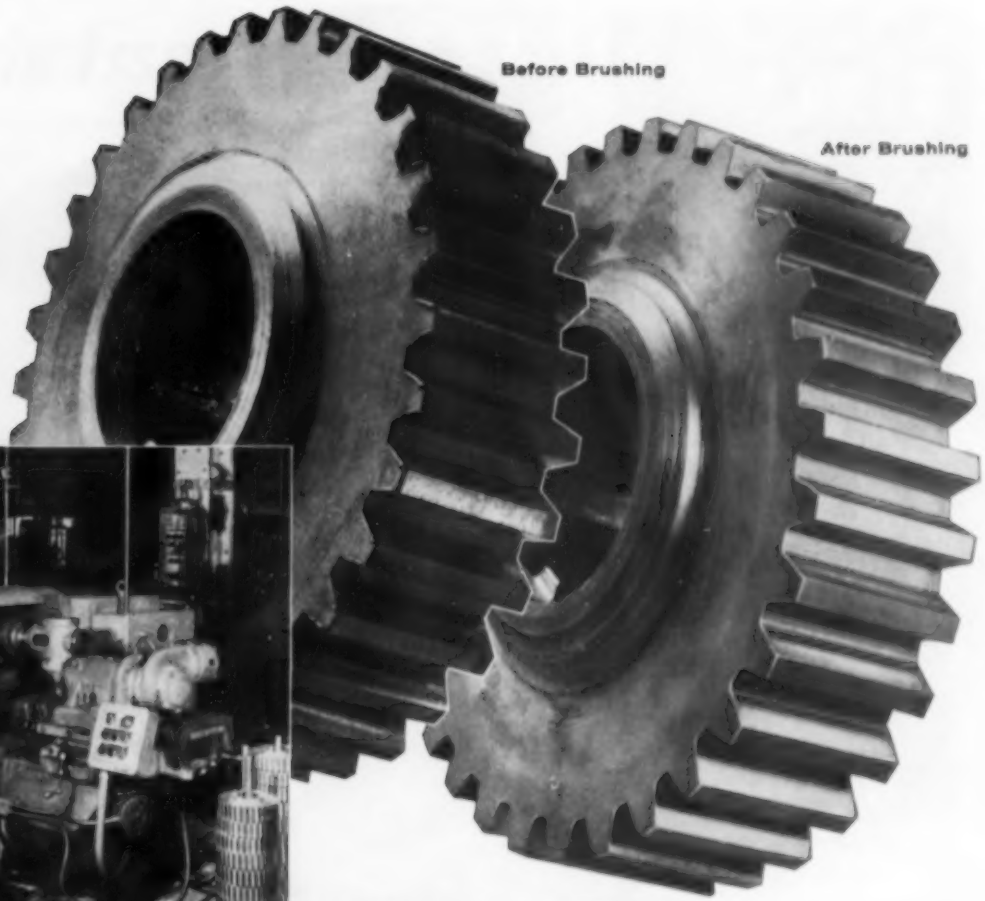

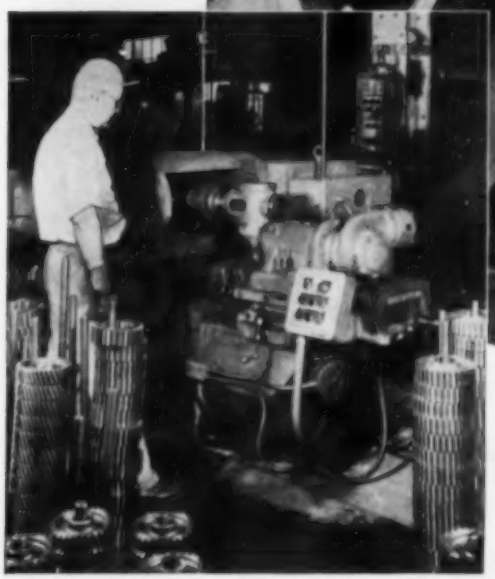

A leading machine company, supplying gears for mining and a variety of other heavy machinery, uses Osborn's Brushamatic 4 and a brushing cycle of 6 seconds a side to finish these gears in lots of 20 and up.

Pays Off... 25 for 1

REMOVING burrs from the teeth and internal spline of this gear was once a 5 minute, hand filing operation. Using Osborn Brushamatic® methods, only 12 seconds are required to remove these burrs. In addition, power brushing blends all surface junctures, reducing fracture-causing concentrations of stress.

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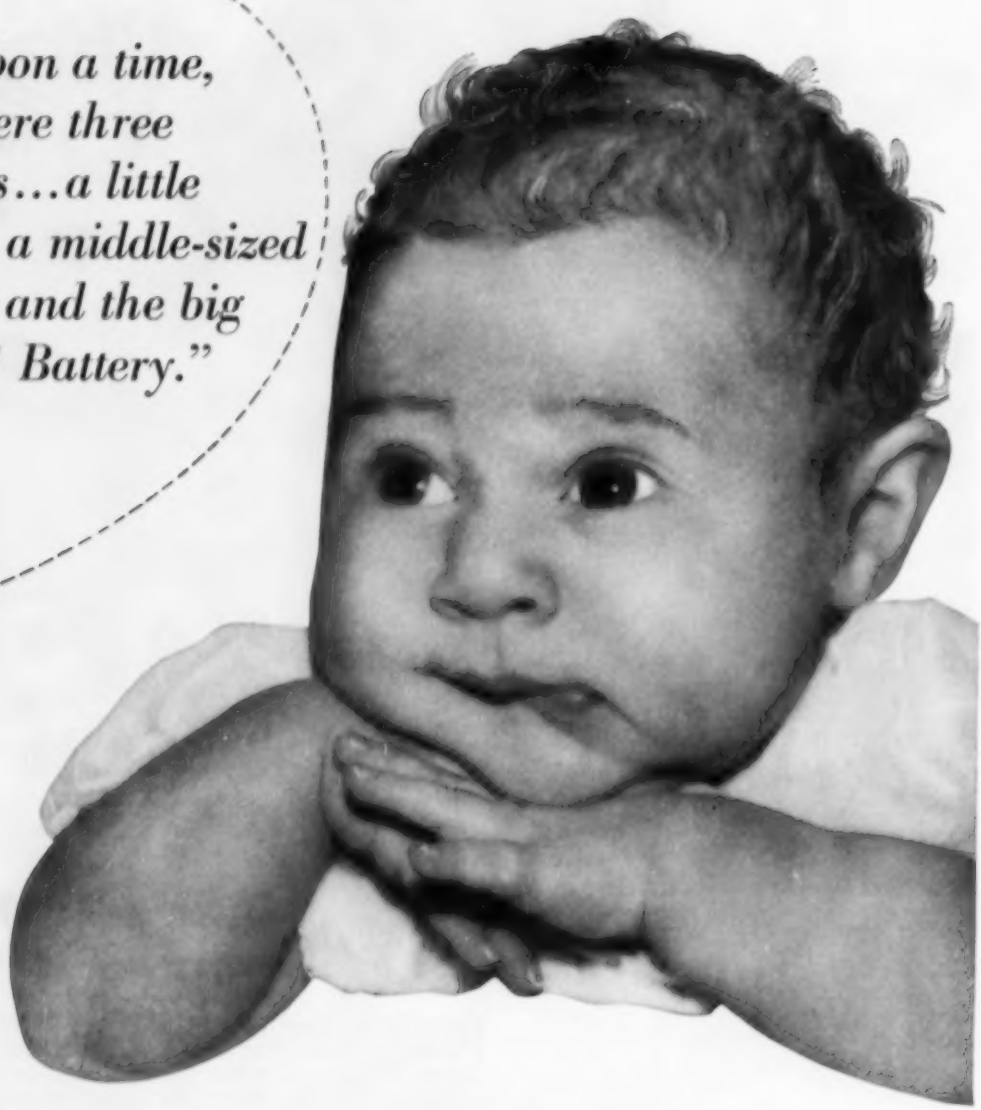
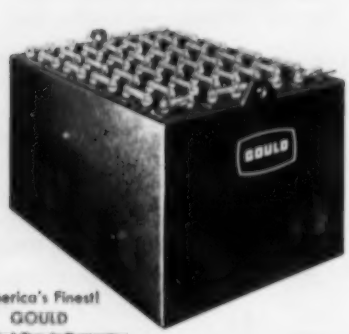
Osborn Brushes

"Once upon a time, there were three batteries...a little battery, a middle-sized battery, and the big ***gould*** *Battery."*





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The Metalworking Weekly

October 8, 1956 Vol. 139 No. 15

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AN OPEN LETTER TO THE STEEL INDUSTRY

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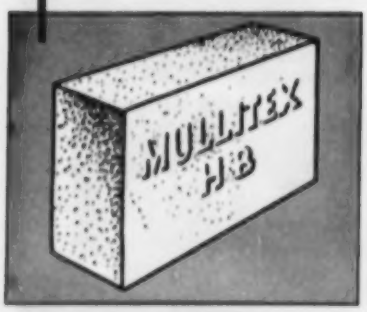
Specialists in fire brick of high bulk density and low porosity.



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behind the scenes

Progress Report

This week's cover suggests there is a prescription (by the way, can anybody tell us the history of the capital R with a fancy tail?) for eliminating gas from metals, but apparently there is no real prescription for this job. The story on page 94 considers the effects of gas in metals, how the stuff gets in there and what to do about it. You don't have to be a metallurgist to read this article. If you have anything to do with buying, selling or fabricating metals, this little technical essay on the activities of "hidden culprits" will hold your attention. The hidden culprits, of course, are oxygen, nitrogen and hydrogen, and the sneaky things they do to metal products shouldn't happen even to your competition.

STEEL Team Clicks

Walt Campbell, STEEL's editor, Harold G. Rowland, advertising director, and L. C. Pelott, Chicago representative, were surprised to find themselves in the Sept. 24 issue of *Advertising Age*. On the "Photo Review of the Week" page, Mr. Campbell was pictured standing before a group of agency executives in Chicago, telling them that metalworking sales would almost treble by 1975, reaching $372 billion, and that advertising expenditures would quadruple in the same period. A modern prophet in a blue flannel suit, Campbell really rocked 'em.

Campbell's thesis on metalworking's fabulous future is based on the U.S. Census Bureau's forecast of a 221,000,000 population in 1975, and findings that per capita consumption of metalworking products increases by $41 per year.

Executive Humor

George O. Hays, president of the Penton Publishing Co., publisher of STEEL, has never outgrown his enthusiastic interest in salesmanship. Wherefore, when he came across a composition on the subject by James X. Cahill (beautiful reprints available from the Verodon Corp., Box 189, Ft. Lauderdale, Fla.), he grinned with delight, and immediately ordered a personal supply. "I'm going to distribute these among our sales force," he chuckled. "Pretty clever, isn't it?"

Usually, when a company president asks a leading question there can be only one answer—but in this instance the hired hand expressed honest agreement. He, too, was delighted with:

The Salesman

"And in those days, behold, there came through the gates of the city a salesman from afar off, and it came to pass as the day went by he sold plenty. And in that city were they that were the order takers and they that spent their days in adding to the alibi sheets. Mightily were they astonished. They said one to the other: 'What the hell. How doth he getteth away with it?' And it came to pass that many were gathered in the back office and a soothsayer came among them. And he was one wise guy. And they spoke and questioned him saying, 'How is it that this stranger accomplished the impossible?'

"Whereupon the soothsayer made answer: 'He of whom you speak is one hustler. He ariseth very early in the morning and goeth forth full of pep. He complaineth not, neither doth he know despair. He is arrayed in purple and fine linen, while ye goeth forth with pants unpressed. While ye gather here and say one to the other, 'Verily this is a terrible day to work,' he is already abroad. And when the eleventh hour cometh, he needeth no alibis. He knoweth his line, and they that would stave him off, they give him orders. Men say unto him 'nay' when he cometh in, yet when he goeth forth he hath their names on the line that is dotted. He taketh with him the two angels 'inspiration' and 'perspiration' and worketh to beat hell. Verily I say unto you, go and do likewise.'"

Shrdlu

(Metalworking Outlook—Page 55)

B.F.Goodrich

Hot acid scrubs tomorrow's refrigerator

A typical example of B. F. Goodrich improvement in rubber

THAT sheet of steel will soon be a refrigerator—*gleaming white* because of the steaming hot acid bath.

To clean rust off steel so enamel will stick, miles of sheets are run through tanks of hot acid that eats off the film of rust. B. F. Goodrich made this low-cost method practical by developing a rubber and brick tank lining that stands the hot acid and the slicing, banging of fast-moving steel.

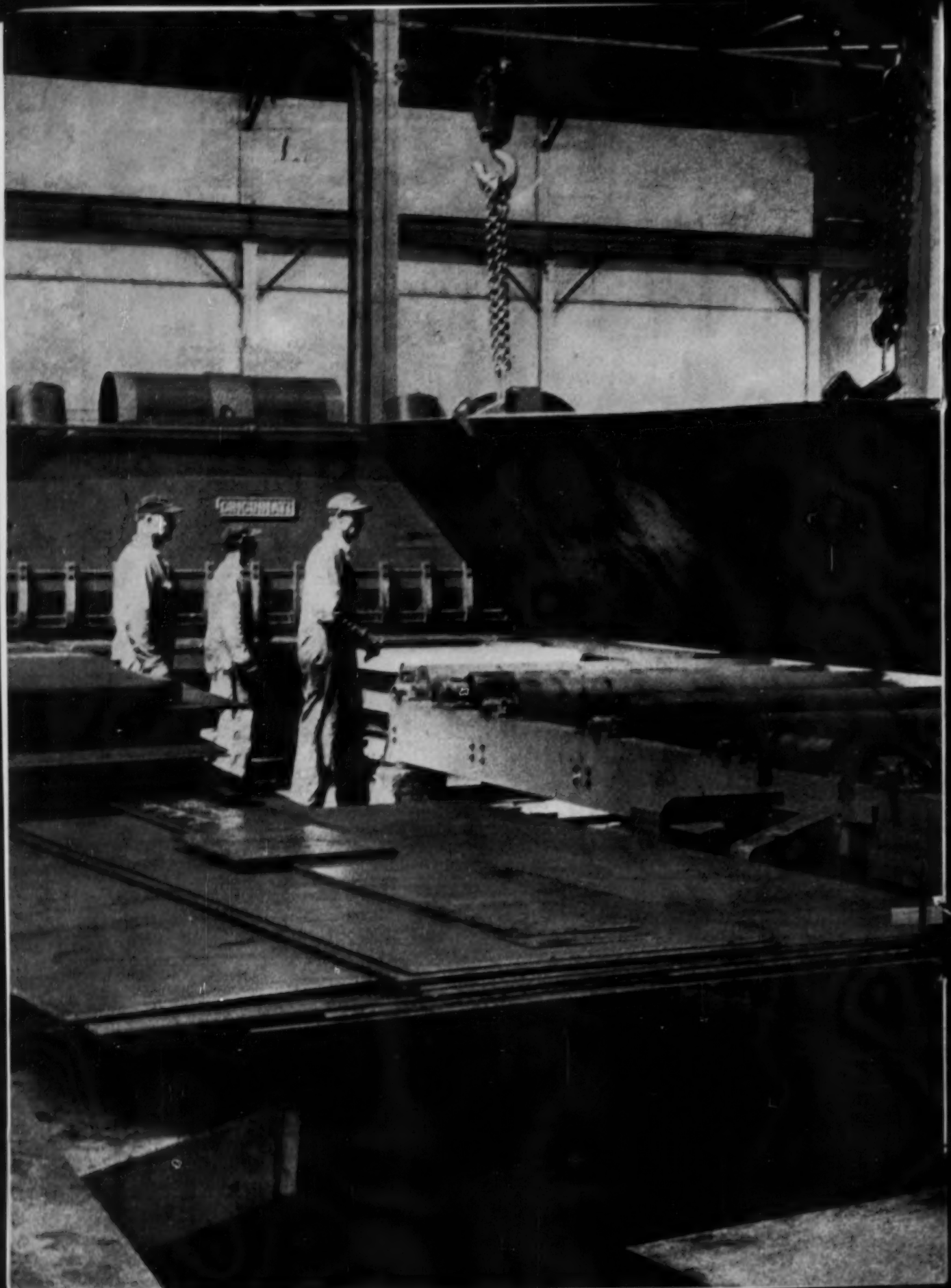
The sheets used to move over stationary skid blocks but these soon wore out with rubbing plus heat plus acid. Now B. F. Goodrich makes a series of small rubber rolls that really turn and the one remaining reason for frequent shutdown has been cured. What's more, the new B. F. Goodrich segment rolls cost one-third less than the old-fashioned type, yet last 3 times longer.

B. F. Goodrich specializes in rubber equipment to handle acids and other corrosive chemicals. Today you'll find B. F. Goodrich rubber covered rolls and rubber lined tanks, pipes and valves in the most modern plants. More important, you'll find rubber lining in some places where it has lasted 15 and even 20 years.

When you buy B. F. Goodrich lining you buy years of engineering background with it—experience that makes sure your lining will be exactly fitted to meet all the special requirements of your work. *B. F. Goodrich Industrial Products Company, Dept. M-779, Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS



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Accurate plate and sheet shearing are two of the most important functions of a modern steel warehouse.

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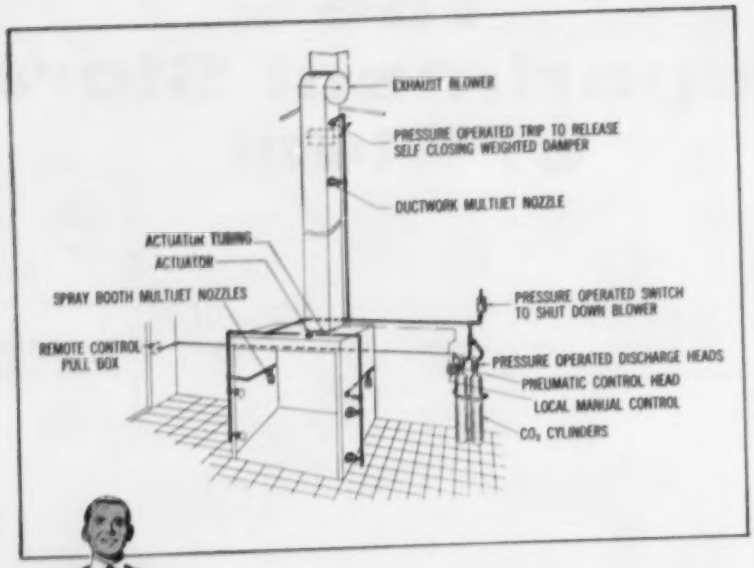


AUTOMATIC FIRE PROTECTION... ENGINEERED FOR SPRAY BOOTHS!

SPRAY BOOTHS can be tricky—safe one minute, ablaze the next. Because they are a special kind of fire hazard, spray booths demand a special kind of *fire protection*. Like a Kidde *Automatic* CO_2 Fire Extinguishing System.

By means of rate-of-temperature-rise detectors, a Kidde system spots—and smothers—even the most vicious blaze the instant it begins . . . pouring clouds of CO_2 over the flames through wide-dispersion Multijet nozzles.

Thanks to the nature of clean, efficient CO_2, a Kidde system leaves no mess to clean up. CO_2 will not harm production equipment or work-in-process . . . it snuffs the fire, then vanishes.

Furthermore, Kidde systems are of the most *advanced* design. They use no falling weights, no old-style mechanical triggering methods. Instead, Pneumatic Control Heads insure an instant and complete discharge of CO_2.

In Kidde tamperproof systems, each moving part is self-enclosed—a safety measure to prevent accidental discharge. And easy-to-read visual indicators show quickly whether the system is "set" or "released." Finally, there are special Directional Valves which let you protect more than one hazard from the same bank of cylinders—a feature that means the most versatile of fire protection.

For more information on the best in fire extinguishing systems, and help in solving your specific fire problems, write Kidde today.

Kidde **Walter Kidde & Company, Inc.**
1060 Main Street, Belleville 9, N. J.
Walter Kidde & Company of Canada Ltd., Montreal—Toronto

LETTERS TO THE EDITORS

Likes Communication Tidbit

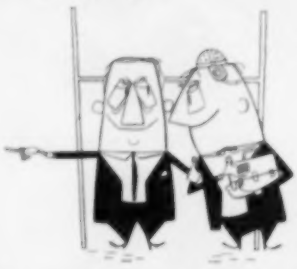
Your recent treatment of business communication—noted briefly on page 583 of the August issue of the *Management Review*—sounds like something I'd like to have. If reprints are available, may I have at least one?

As a writer for our *Management Letter*, I prepare lead stories, or, oftener, select quotable material. If I find passages that we'd like to quote verbatim, may we have permission?

Robert T. Swartz
Information Supervisor
Public Relations Department
Michigan Bell Telephone Co.
Detroit

• *We are forwarding a copy of the article, "Business Communication: Put It on Executive-Saving Time" (May 16, 1955, page 103). Permission is granted to quote verbatim if proper credit is given.*

Calling the Signals



The other day I picked up the Sept. 24 issue of STEEL. Our company is a subscriber, but, like many other busy people, I seldom find time to browse through periodicals which do not directly affect my area of management.

That issue's article, "Motivating Men To Produce More" (page 105), which is No. 8 in your 1956 Program for Management, is interesting and well worth reviewing periodically.

I would appreciate your forwarding a copy to me. Also, I would enjoy receiving reprints of other articles in the series.

J. F. McCarthy
Manager
Production Control Department
Hoover Ball & Bearing Co.
Ann Arbor, Mich.

Error of Magnitude

In the article, "Automatic Assembly Is Next" (Sept. 10, page 140), you mention a Bodine automatic assembly unit which assembles dampening spring assemblies.

You state the capacity of this machine to be 40 assemblies per hour; in reality, the machine produces 40 assemblies per minute—or 2400 assemblies per hour—and is a completely hopper fed automatic unit.

This was no doubt an error in transposing the material into this article, but, in this particular instance, it is an error which is 60 to 1 in magnitude. Needless to say, we do not believe it

(Please turn to page 12)

FEEDING FURNACES . . .
Another proven PAYLOADER® job!

The predominance of "PAYLOADER" tractor-shovels at steel mills, foundries and industrial plants of all kinds is silent tribute to their ability to "take it" as well as to "dish out" real production on all kinds of bulk-material handling jobs.

Today's "PAYLOADER" units are the finest in tractor-shovel history — in handling ease and maneuverability, in productive capacity, in reliability and low maintenance. And today's "PAYLOADER" line is also the most complete, most-proven line of tractor-shovels available — from 18 cu. ft. to 2¼ cu. yd. bucket capacity.

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Model HH — 1¾ cu. yd. capacity
Model HO — 2¼ cu. yd. capacity

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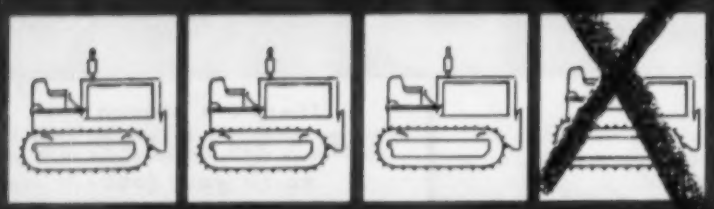

For years, the construction industry has been the "proving ground" for heavy equipment. And the *toughest* jobs, under the severest conditions, have constantly been assigned to crawler tractors. That's why men who built and used crawlers were among the first to recognize the advantages of torque converter drive . . . and *are* the men who know converters best.

Today, the four manufacturers of the most powerful crawler tractors available all have torque converter equipped models. Of these, *all three of the "Big 3" volume producers*—Allis-Chalmers, Caterpillar and International Harvester—have special torque converter transmissions, in which they *standardize* on Twin Disc Torque Converter Components.

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LETTERS

(Concluded from page 10)

puts Bodine equipment in a desirable light.

We are not intending to criticize but merely to bring this error to your attention.

E. F. Bodine
Vice President
Bodine Corp.
Bridgeport, Conn.

Involved in Site Location

I am interested in obtaining two copies of the article, "Planning a Suburban Plant" (Aug. 20, page 84). It was most informative, and I should like to have the additional copies so that others in the company who are often involved in site location might refer to it.

Jay J. Martin Jr.
Arthur D. Little Inc.
Cambridge, Mass.

Management Wants Copies

Please send two copies of the seventh article in the 1956 Program for Management, "To Merge or Not To Merge" (Aug. 13, page 89). The article is an excellent one and our top management is interested in having personal copies for their use.

Gerald F. Gilbert Jr.
Manager of Marketing
Atlas Mineral Products Co.
Mertztown, Pa.

Doing Similar Brazing Work

We were pleased to read your articles, "How To Braze Stainless," Parts I and II, in the Sept. 3 and 10 issues.

Since we are doing work in this line ourselves, we found the articles informative and would appreciate receiving four copies for distribution to our library and engineering personnel.

H. D. Huggins
Chief Engineer
Industrial Division
Modine Mfg. Co.
Racine, Wis.

Mailing Addresses Wanted

We would appreciate two copies of your article, "Doing More with Short Run Dies" (Sept. 3, page 79). We would also like to have the mailing address of Templet Industries Inc. and the Accurate Steel Rule Die Manufacturers.

J. N. Thomas
Vice President-General Manager
Perley A. Thomas Car Works Inc.
High Point, N. C.

• ***The address of the Templet Industries Inc. is: 160 Flushing Ave., Brooklyn 5, N. Y. Address of the Accurate Steel Rule Die Manufacturers is: 26-28 W. 21st, New York 10, N. Y.***

This article mentions the Small Lot Stamping Institute, Cleveland. Can you supply its address so I can write for further information?

R. W. McEwan
Engineering Purchasing Agent
Crosley & Bendix
Home Appliances Divisions
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• ***Write the institute in care of HPL Mfg. Co., 15210 Miles Ave., Cleveland, O. The secretary-treasurer is Melvin Lorents.***

Sterling "sixth element" grinding wheels ...tailor-made to your job requirements

GRINDING WHEELS must be tailored exactly to your job requirements. To deliver top performance, they must combine, in just the right proportions, the five standard elements of a grinding wheel formula—abrasive grain, size, grade, structure, and bond. But in formulating *your* grinding wheel, Sterling also considers a *sixth element*.

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Because Sterling wheels are always formulated with the sixth element in mind, they can lower your grinding costs by prolonging wheel life, speeding grinding operations, and reducing downtime. For a thorough study of your grinding operation, call in a skilled Sterling abrasive engineer, or contact your nearest Sterling distributor.

For fast, repetitive work, such as this cylindrical grinding operation, a job-tailored Sterling grinding wheel will help you maintain production schedules, with minimum wheel consumption and maximum economy.

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"Wheels of Industry"—*Vitrified and Resinoid —to meet the exact requirements of industry.*

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STERLING GRINDING WHEEL CO., TIFFIN, OHIO—SUBSIDIARY OF ABRASIVE AND METAL PRODUCTS COMPANY

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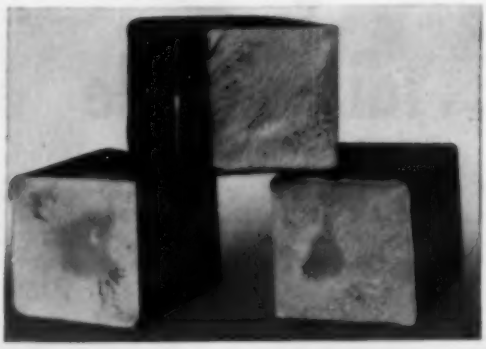
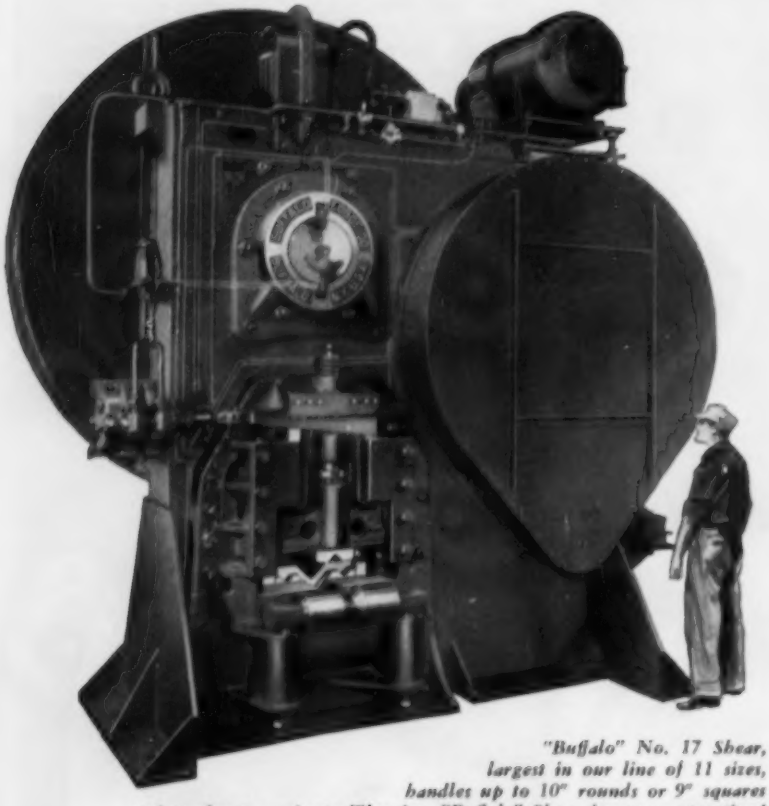
FOR BETTER FORGINGS AT LOWER COST





"Buffalo" No. 17 Shear, largest in our line of 11 sizes, handles up to 10" rounds or 9" squares at 6 strokes per minute. There's a "Buffalo" Shear for your operation!

"BUFFALO" BILLET SHEARS not only cut your forging stock to length squarely and accurately at production speeds, but result in better preparation of the stock.

With "Buffalo" Billet Shears, the knives penetrate only 5/16", causing a sharp, clean *fracture*. Since most of the "cut" is actually a fracture, there is no molecular disturbance, as with sawing or burning. Visual inspection for porosity is greatly facilitated.

. . . And in these powerful machines you get "Q" Factor* features such as "power" lubrication—rigid arc-welded steel plate frames—air operated clutches, counterbalance and hold-down — that assure you many years of profitable service with almost negligible maintenance. Write today for Bulletin 3295-C for all details.

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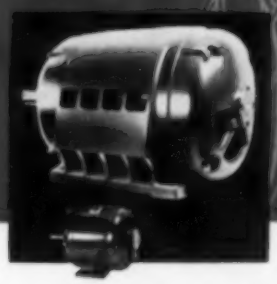
ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

Why not build the cart before the horses?



Just tell us here at Master what you want in power drives—and get the utmost in flexibility, compactness and performance. It probably won't be as complicated as the multi-shaft Gearmotor illustrated here, with 14 shafts turning at diverse speeds. But, regardless of what you need, Master can supply the right combination of horsepower, shaft speed and mounting features with whatever Master components are required—all combined in one compact efficient unit. Just ask for information.

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Her wires are crossed *and she loves it!*

Peerless crosses them for her freezer basket and they're happy, too!

Besides freezer baskets, Peerless Wire Goods cross wire welds a variety of refrigerator shelves, fan guards, dishwasher racks, etc. And Peerless knows that keeping themselves and everyone else happy in such an extremely competitive business requires a lot of production ingenuity.

Here's why: Success in the wire products business depends on methods. And the sheer ingenuity of Peerless methods *requires* the capacity of Sciaky patented three-phase resistance welding equipment . . . which is not unusual, because the Sciaky technique of fabrication is designed to put the profits back into manufacturing!

Whether or not you make wire goods . . . if you fasten metals together to make your product, do it faster, better and at lower cost with Sciaky resistance welding techniques—like Peerless does.

SCIAKY

Largest Manufacturers of Resistance Welding Machines in the World

The facts are impressive—turn the page and see for yourself...

Ingenious Tool-Up Produces 45 Cross-Wire Welds per Stroke

Sciaky Patented Three-Phase Resistance Welding Readily Satisfies This Unusual Demand

Imaginative tooling applied to a Sciaky 150 KVA patented Three-Phase press type welder has put Peerless Wire Goods, Inc., Lafayette, Ind., in a solid position in a field where the ultimate in efficiency of methods and equipment is necessary for survival.

In the fabrication of freezer baskets, for example, Peerless makes 45 cross wire welds simultaneously with one stroke of the welder, an unusual demand that can be satisfied only by the Sciaky patented Three-Phase principle of operation. Equally as important, Sciaky Three-Phase control eliminates burrs and splashes at the weld.

Dishwasher baskets have 124 welds made in twelve strokes—another big saving in time and handling.

Jobs like this provide good examples of the concept behind Sciaky Resistance Welding Techniques . . . *to put the profits back into manufacturing.*

Another example of how the Sciaky technique of fastening is used in cross wire products is given in "Resistance Welding At Work", Vol. 3, No. 9. Write for your free copy, today.

Upper—All the welds of a side web being made simultaneously. *Lower*—View showing the multiple electrode tooling that makes 45 welds per stroke.

FOR SPECIFICATION WELDING

If you must do precision welding such as required for air frame, jet engine and ordnance manufacture, ask about the new Sciaky Predetermined Electronic Counter Weld Control. Write for Bulletins 338 and 339.

Largest Manufacturers of Resistance Welding Machines in the World

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Steel gussets, ⅝-in. thick are sigma welded to ⅞-in. thick drum ends at an average speed of 15-in. per minute.

This welding operator doesn't have to bother with fluxes—and he doesn't lose valuable time changing burned down electrodes. In fact, by using sigma welding in this operation, the Cardwell Manufacturing Company, Wichita, Kansas has increased welding speed and almost doubled arc time. The results—a better product, faster, and at less cost.

AUTOMATIC WIRE FEED

Sigma welding uses a welding wire, supplied from a convenient sized coil, as a consumable electrode. In this case it is stainless steel wire which is fed automatically, and at a predetermined rate, into the welding arc. This ups welding speeds and simplifies work.

NO FLUX

The arc is maintained in a shield of argon gas which envelopes the area between welding wire and work piece. Inert gas protection assures highest weld quality, and further simplifies welding operations.

Sigma welding is available in both manual and mechanized setups. Call or write your local LINDE representative for free illustrated literature, and find out how you can gain new production speed and unit quality with a sigma welding installation.

Linde Air Products Company
A Division of Union Carbide and Carbon Corporation
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Two Separate Circuits Mean

Reliable Rectifier Operation

ALLIS-CHALMERS

Mercury Arc Rectifiers

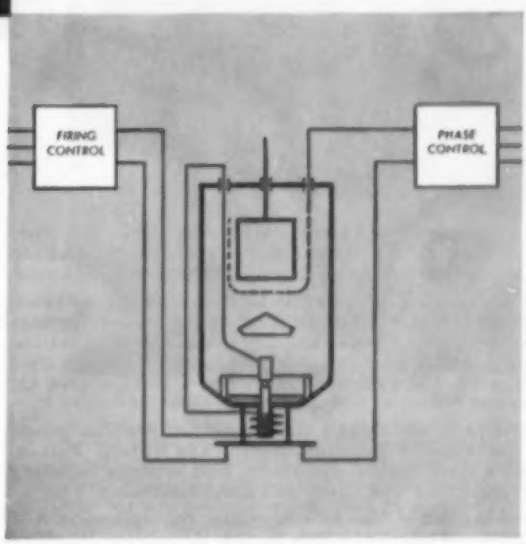
One of four metal-enclosed assemblies in a midwestern installation with a total capacity of 15,000 kw at 620 volts, dc.

1. Firing Circuit

A small dc excitation arc is automatically ignited only once, when the unit is started. It is then maintained on the mercury cathode of each rectifier tube. It offers advantages similar to a pilot light. Since it is far easier to maintain an arc than to start it, this feature reduces the chance of the excitron losing excitation during power supply disturbances.

2. Phase Control Circuit

A separate circuit utilizes the deionizing grid to obtain phase control. Grid-type phase control permits operation in the clean region near the anode where ion density is lowest, instead of on the surface of the cathode mercury pool where there is turbulence and contamination. Reliability of phase control does not depend on the condition of the mercury. This is an exclusive excitron feature.



Only Excitron Rectifiers Provide Separate Circuits

for these two all-important functions. Improved operation results — one function is never sacrificed for the other — you get optimum operation from each.

For Complete Information on rectifier operation, call your nearby A-C office, or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-5136

Republic Stacking Racks Piston Handling

EASY ENTRY by fork or platform truck is a feature of the PR-15 Stacking Rack. Open construction allows quick identification of stored material. Side and bottom corners are designed to permit stacking to any practical height.

Two Divisions of Thompson Products, Inc., are sharing the benefits of a simplified and speeded-up handling system—the result of using Republic PR-15 Stacking Racks.

Thompson's Light Metals Division produces semi-finished automotive pistons. After inspection the pistons are transported across a yard to the Replacement Division where finished machining is performed. They are then packaged for shipment or moved to a storage area for future use.

Thompson was using a combination of wooden pallets and steel tubs for handling, moving and storing. This involved a great deal of equipment, four separate handling operations, and was costly and time-consuming.

Looking for a way to streamline the operation and cut costs, Thompson contacted Republic. Pooling their knowledge and experience, engineers of both companies worked out the design of the PR-15 Stacking Rack. Republic's Pressed Steel Division fabricated the units.

Besides speeding the entire handling operation and eliminating unnecessary loading and unloading, Thompson has found the PR-15's provide these additional advantages: (1) The racks can be used right at the work benches and machines on the finishing line. (2) Fewer PR-15's can handle the same volume of pistons as the old equipment. (3) Storage space is conserved because design and construction features of the racks permit stacking to any practical height.

Fabricated from tough, strong steel, these units have been in continuous use for over six years—and hold promise of economical service for many more years to come.

Perhaps the PR-15 Stacking Rack is the solution to your handling problem. Or you may require the design of a completely new unit. Our Materials Handling Engineers will help you without obligation. For more information contact your Republic Materials Handling Equipment Representative. Or mail the coupon.

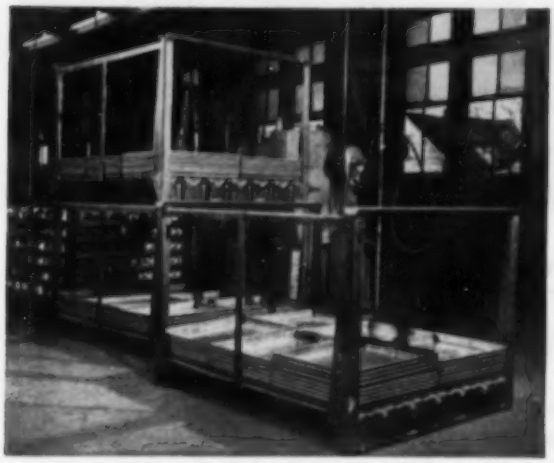
REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

Simplify and Speed at Thompson

AFTER INSPECTION, semi-finished pistons are placed on PR-15's for movement to the finishing line. Note the strong corrugated steel construction of the skid section.



HAVING COMPLETED the circuit from semi-finishing to finishing to shipping or storage, empty PR-15 Racks are stacked up waiting for another load of pistons.

HERE ARE MORE REPUBLIC MATERIALS HANDLING PRODUCTS

CHAIN SLINGS SPEED HANDLING of heavy and hard-to-manage materials. Republic's Bolt and Chain Division makes chain slings in Alloy Steel, High Test Steel and Wrought Iron. All are proof tested and warranted to meet or exceed specifications. Because each type has specific applications, we recommend talking over your requirements with a Republic chain engineer. Send coupon for more information.

STEEL PALLET RACKS made by Republic's Berger Division provide a practical, economical way to palletize and stack bulky, uneven, odd-lot and fragile materials. Tubular steel supports adjust every six inches to handle palletized material of any height. Two-way entry permits loading and unloading from either side. Select single pallets from any level without restacking. Write for complete description, specifications and quotations.

REPUBLIC STEEL CORPORATION
Dept. C-2510
3120 East 45th Street, Cleveland 27, Ohio

☐ Have a Materials Handling Engineer call.

Send literature on the following Republic products.
☐ PR-15 Stacking Racks ☐ Chain Slings ☐ Pallet Racks

Name_____ Title_____

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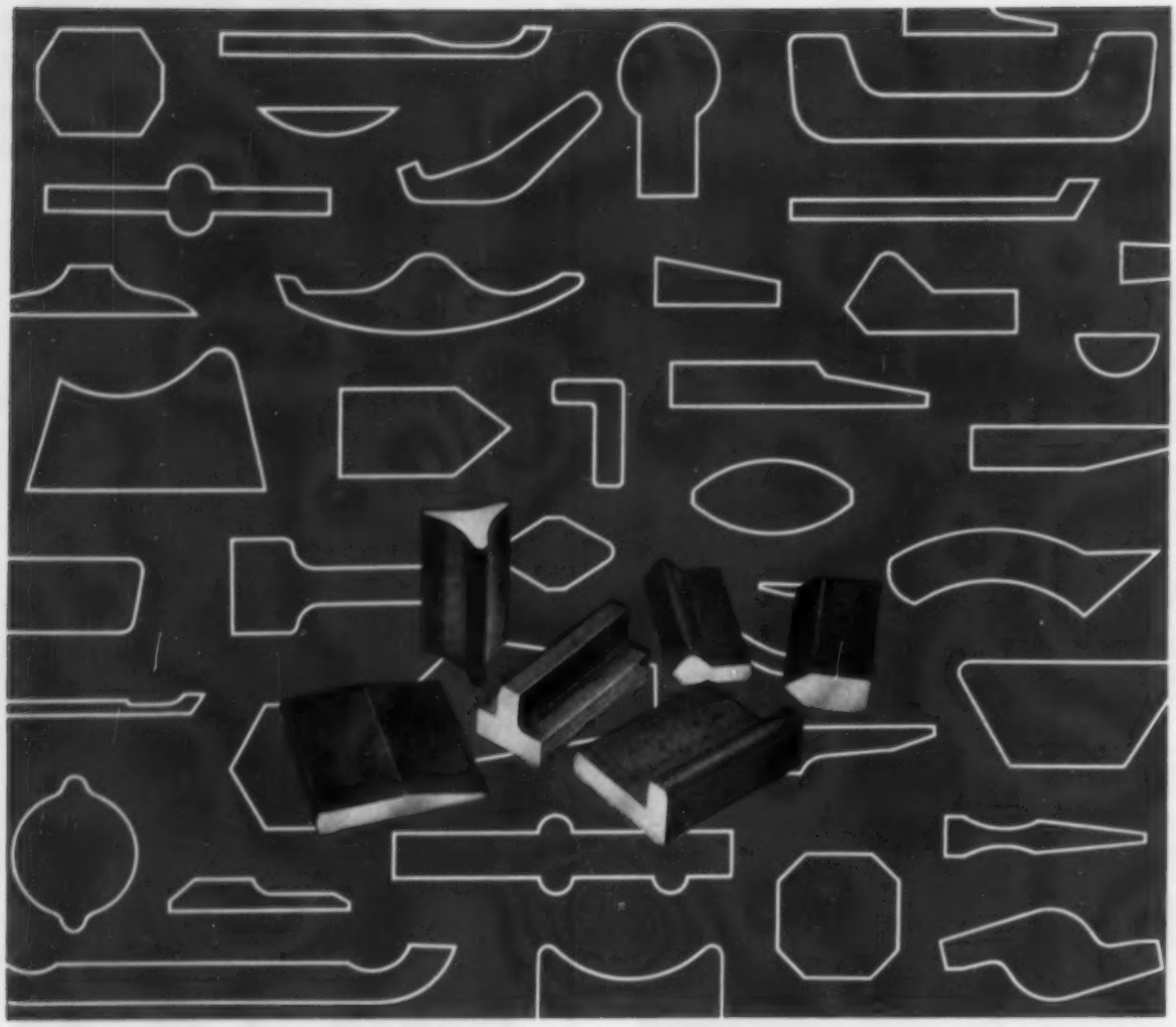
and Steel Products



Crucible special shapes

for better alloy steel parts at lower cost . . .

If you're machining intricate sections from solid bars—or using expensive forgings—stop! Choose instead, a *Crucible special shape* that approximates the finished part. *Crucible special shapes* eliminate rough-machining operations . . . reduce scrap losses.

There's practically no limit to the *special shapes* available at Crucible, in a wide variety of alloy steels. Rolls for over 400 special shapes are available—other shapes can be rolled to your specifications. Your local Crucible representative can give you the whole story of how *special shapes* can cut costs—save time. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

CALENDAR
OF MEETINGS

Oct. 8-10, American Society of Mechanical Engineers: Lubrication conference, Chalfonte-Haddon Hall, Atlantic City, N.J. Society's address: 29 W. 39th St., New York 18, N.Y. Secretary: C. E. Davies.

Oct. 8-10, Institute of Metals Division, American Institute of Mining, Metallurgical & Petroleum Engineers Inc.: Fall meeting, Hotel Carter, Cleveland. Institute's address: 29 W. 39th St., New York 18, N.Y. Secretary: Ernest Kirkendall.

Oct. 8-11, Society for Non-Destructive Testing: Fall technical meeting, Hollenden hotel, Cleveland. Society's address: 1109 Hinmann Ave., Evanston, Ill. Secretary: Philip D. Johnson.

Oct. 9, Industrial Heating Equipment Association: Fall technical meeting, Hotel Statler, Cleveland. Association's address: 412 Fifth St. N.W., Washington 1, D.C. Executive vice president: Carl L. Ipsen.

Oct. 8-12, American Society for Metals: Annual meeting, Hotel Statler, Cleveland. Society's address: 7301 Euclid Ave., Cleveland 3, O. Secretary: W. H. Eisenman.

Oct. 8-12, American Welding Society Inc.: National fall technical meeting, Cleveland hotel, Cleveland. Society's address: 33 W. 39th St., New York 18, N.Y.

Oct. 8-12, National Metal Congress & Exposition: Public Auditorium, Cleveland. Information: American Society for Metals, 7301 Euclid Ave., Cleveland 3, O. Secretary: W. H. Eisenman.

Oct. 10-12, Material Handling Institute: Fall meeting, Traymore hotel, Atlantic City, N.J. Institute's address: One Gateway Center, Pittsburgh 22, Pa. Managing director: R. Kennedy Hanson.

Oct. 10-12, Society of Automotive Engineers Inc.: National transportation meeting, Hotel New Yorker, New York. Society's address: 29 W. 39th St., New York 18, N.Y. Secretary: John A. C. Warner.

Oct. 11-12, National Foundry Association: Annual meeting, Sheraton-Cadillac hotel, Detroit. Association's address: 53 W. Jackson Blvd., Chicago 4, Ill. Executive secretary: C. T. Sheeham.

Oct. 14-16, American Machine Tool Distributors Association: Annual meeting, Broadmoor hotel, Colorado Springs, Colo. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: Thomas A. Fernley Jr.

Oct. 15-16, Rail Steel Bar Association: Fall meeting, Sheraton Mt. Royal hotel, Montreal, Que. Association's address: 38 S. Dearborn St., Chicago 3, Ill. Secretary: W. H. Jacobs.

Oct. 15-17, American Gas Association: Annual convention, Haddon Hall and Traymore hotels and Atlantic City Auditorium, Atlantic City, N.J. Association's address: 420 Lexington Ave., New York 17, N.Y. Managing director: C. S. Stackpole.

Oct. 17-19, American Society of Body Engineers Inc.: Annual technical convention, Rackham Memorial Bldg., Detroit. Society's address: 100 Farnsworth, Detroit 2, Mich.

Oct. 18-20, Foundry Equipment Manufacturers Association Inc.: Annual meeting, Greenbrier, White Sulphur Springs, W. Va. Association's address: One Thomas Circle, Washington 5, D. C. Secretary: C. R. Heller.

Oct. 20-23, Conveyor Equipment Manufacturers Association: Annual meeting, Greenbrier, White Sulphur Springs, W. Va. Association's address: One Thomas Circle, Washington 5, D.C. Executive vice president: R. C. Sullenberger.

DO YOU NEED ANSWERS TO THESE QUESTIONS?

1 How can I electroclean steel at lower cost?

2 How can I find a brass cleaner that gives better protection against tarnishing?

3 How can I reduce rejects due to faulty electrocleaning of zinc die castings?

***Answer* 1** Following an Oakite recommendation, one plater made a small change in his steel-cleaning cycle and soon had two tankfuls of cleaning solution doing the work of three—and the plate adhesion was improved. *See booklet offered below.*

***Answer* 2** Oakite has a new brass cleaner that provides scientific protection against the oxygen that tarnishes brass and other copper alloys during the application of reverse current. *See booklet offered below.*

***Answer* 3** Oakite has an anodic conditioner that offers brighter plating of zinc die castings . . . with no anodic blackening and fewer rejects. *See booklet offered below.*

FREE For more information about the electrocleaning of steel, brass or zinc die castings, ask for one or all of the booklets listed in the coupon.

four good steps toward better electroplating on steel
NEW
Good news about electrocleaning zinc-base die castings
OAKITE

Technical Service Representatives in Principal Cities of U. S. and Canada

OAKITE PRODUCTS, INC.
34E Rector Street, New York 6, N. Y.

Send me the free booklets I have checked below:

☐ "Four good steps toward better electroplating on steel"

☐ "What's NEW for electrocleaning brass and other copper alloys"

☐ "Good news about electrocleaning zinc-base die castings"

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Company.....

Address.....

3/4"- 4.320" threading range

. . . with one LANDMACO Machine

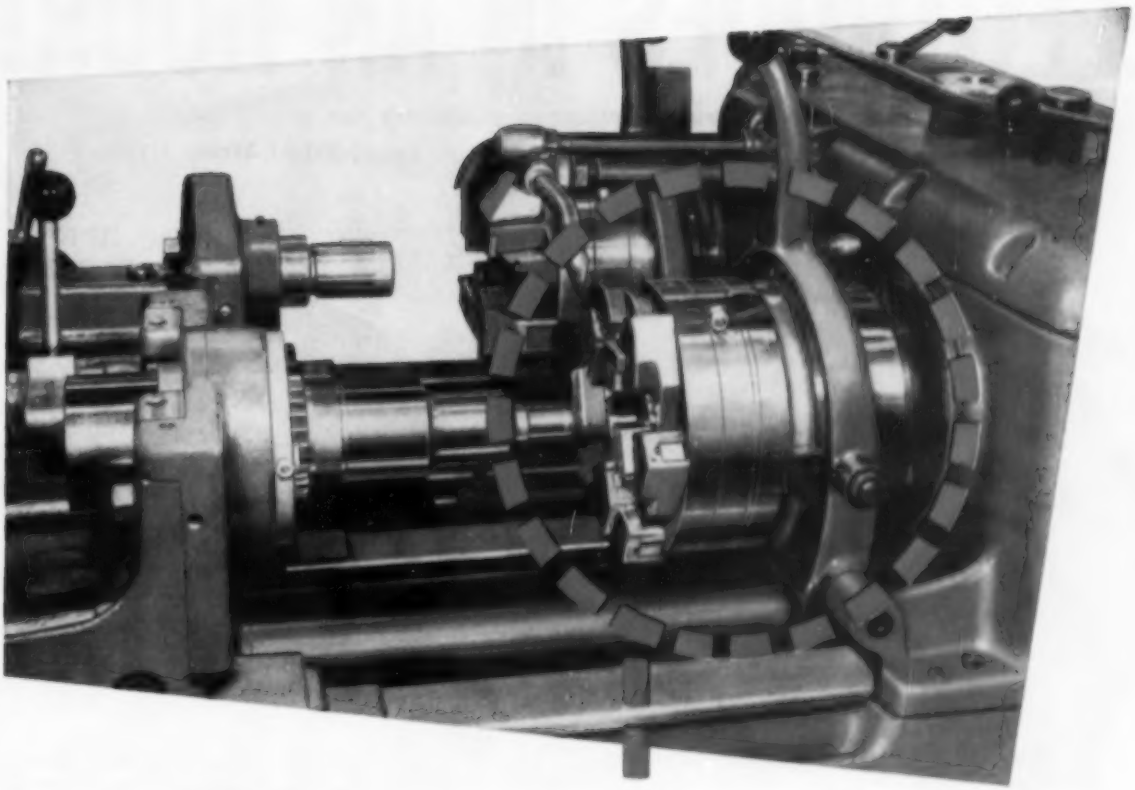
The Twin Disc Clutch Company Hydraulic Division in Rockford, Illinois, is able to thread a wide variety of work from 3/4"-32 pitch to 4.320"-12 pitch with just one LANDMACO Threading Machine.

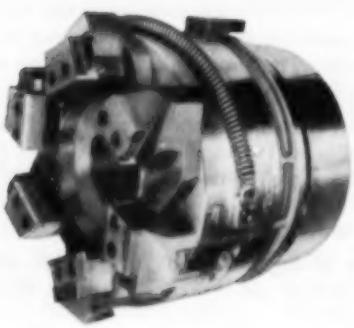
A six-chaser 40RX LANCO Head with a range of 2½" to 9¼" (5-1/8" bore) is mounted on the right-hand spindle to produce fine-pitch large-diameter threads. A 2½"R LANCO Head with a range of ½" to 2½" is used on the other spindle to produce coarse-pitch threads, small-diameter threads, and long thread lengths.

One of the many different operations performed by this equipment is illustrated—threading clutch output shafts with the 40RX Head. The workpiece is made from C1045 steel, heat-treated to 229-269 Brinnell hardness. A special 12-pitch UN Thread, with a 3.669"-3.676" pitch-diameter tolerance, is cut .830" long to within ¼" of the shoulder. 15 pieces are threaded per hour, including 100% inspection by gauging on the machine. Even with heat-treated material and exacting thread finish requirements, 100 pieces are completed between chaser grinds.

The different types of special workholding fixtures designed for these short-run operations at Twin Disc are a major factor in the versatility of the equipment used. For example, in the operation illustrated, a special carriage front allows this LANDMACO Machine to thread a workpiece with a diameter well beyond its normal range. These special fixtures may be used interchangeably with the standard vises.

This installation shows how LANDIS Equipment and Engineering can combine to economically solve a problem in Thread Production. May we suggest the most efficient method for producing your Threads?





For additional information:

* on the many types and styles of LANDIS Die Heads, ask for Bulletins F-80 or F-90
* on LANDMACO THREADING Machines, ask for Bulletin H-76.

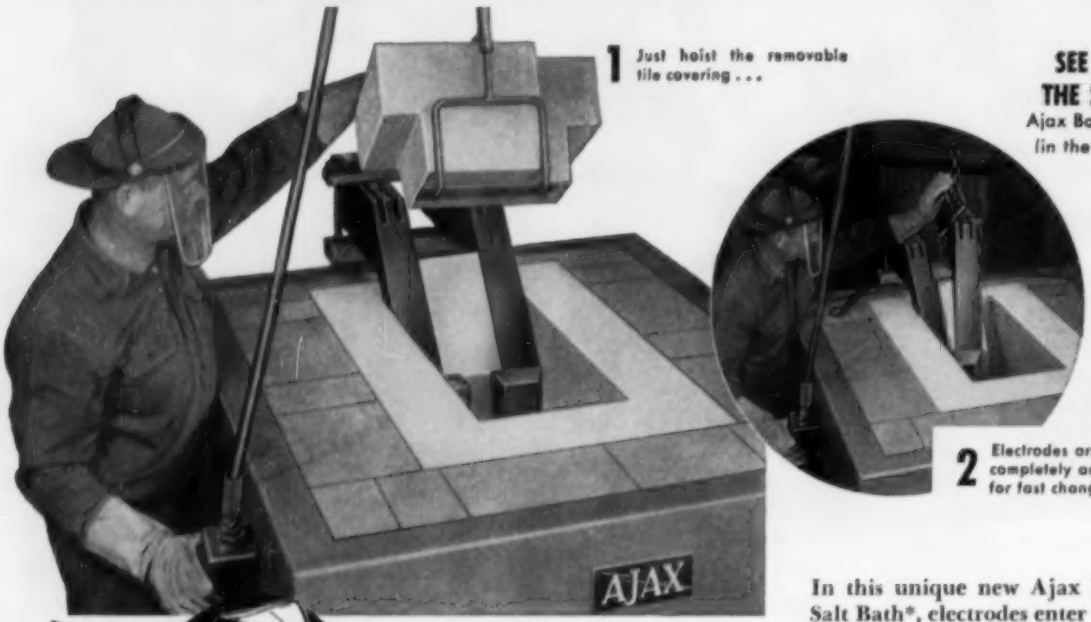
THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT - CUTTING - TAPPING - GRINDING - ROLLING

LANDIS *Machine* COMPANY

WAYNESBORO • PENNSYLVANIA • U. S. A.

Now! CHANGE SUBMERGED ELECTRODES IN AN HOUR!

. . . without disturbing furnace casing or pot
. . . at substantial savings of labor, material and time



1 Just hoist the removable tile covering . . .

SEE IT AT THE SHOW!
Ajax Booth 1609
(in the Arcade)

2 Electrodes are now completely accessible for fast changing.

AJAX
electric
SALT
BATH
furnaces

In this unique new Ajax Electric Salt Bath*, electrodes enter the furnace from over the top, *yet retain all the favorable characteristics of the submerged design.* They are replaced by hoisting a removable tile, putting in new ones and setting the tile back in place.

It's as simple as that! No need to disturb either the pot or furnace casing. "Down time" is held to an absolute minimum. Salt is saved. Spare casings are no longer required. A complete electrode change takes about an hour per pair. Often, the change can be accomplished before the molten salt can solidify.

Write for bulletin giving details of this revolutionary design feature for either new or old Ajax Electric Salt Bath Furnaces.

ALL THE ADVANTAGES OF COMPLETELY SUBMERGED ELECTRODE DESIGN!

The removable tile covering seals the electrodes against air, thus giving all the advantages of submerged design including protection against oxidation at the salt line. Life of new type Ajax electrodes using no critical materials compares more than favorably with that of conventional nickel alloy electrodes in conventional-electrode furnaces.

*Patent Pending

AJAX ELECTRIC COMPANY
952 FRANKFORD AVENUE, PHILADELPHIA 23, PA.

Associate Companies: Ajax Electric Furnace Corporation • Ajax Engineering Corporation • Ajax Electrothermic Corporation

BLAW-KNOX MEDART makes what it takes

for high speed straightening of cold finished stock

Designed around the principle used in the famous Blaw-Knox Medart 2 roll Rotary Straightener, the 2 & 2 Universal Straightener is especially adapted for high speed applications. It is widely used in a direct production line with a draw bench for high speed straightening of cold drawn bars.

In this machine, each roll is driven by its own motor through a completely enclosed V-Belt drive. This simplified arrangement keeps downtime and drive maintenance to a minimum. What's more it provides for control of throughput rates by varying the speed of the motors. Roll speeds are synchronized by means of electrical interlocks between the motors.

Space requirements are kept to a minimum through compact design and the small number of working parts. This compact set-up simplifies discharge of work from the machine, making it ideally suited to shorter length workpieces.

The Blaw-Knox Medart 2 & 2 Universal Rotary Straightener and Polisher is available in sizes to handle bars and tubes in diameters of ¼" to 4½". Contact us for detailed information, technical assistance or service.

50th Anniversary
BLAW-KNOX
1906-1956

BLAW-KNOX COMPANY
Foundry & Mill Machinery Division
Blaw-Knox Building • 300 Sixth Avenue
Pittsburgh 22, Pennsylvania

How good is your advertising manager?

There is a quick way to find out—and it's also easy. Just make sure that your organization permits him to *manage* your advertising.

That may seem obvious, but many industrial companies have never taken time to define the functions of the advertising department. As a result, there is confusion. In many cases advertising gets to be little more than a service department, merely producing what other departments ask for.

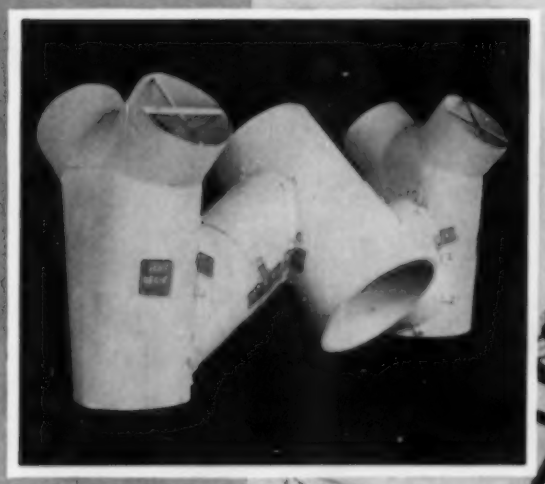
Your advertising manager should be a full-time player on your marketing team. When sales objectives are set, it is his task to plan and carry out the advertising program which will give the most help in attaining those objectives.

That's what you hired him for. If he isn't permitted to do that, you are wasting his time and talents—and good men in other departments are wasting their time and talents trying to be advertising men.

National Industrial Advertisers Association, Inc.

271 Madison Avenue, New York 16, New York

An organization of over 4000 members engaged in the advertising and marketing of industrial products, with local chapters in ALBANY, BALTIMORE, BOSTON, BUFFALO, CHICAGO, CLEVELAND, COLUMBUS, DALLAS-FORT WORTH, DENVER, DETROIT, HAMILTON, ONT., HARTFORD, HOUSTON, INDIANAPOLIS, LOS ANGELES, MILWAUKEE, MINNEAPOLIS-ST. PAUL, MONTREAL, QUE., NEWARK, NEW YORK, PHILADELPHIA, PITTSBURGH, PORTLAND, ROCHESTER, ROCKFORD, ST. LOUIS, SAN FRANCISCO, TORONTO, ONT., YOUNGSTOWN.



ENGINEERING . . . FABRICATION . . . AND ERECTION BY *Pollock*

The William B. Pollock Company is the oldest engineer, fabricator and erector of steel work for blast furnaces in the world.

Only a few companies in the world can engineer, fabricate and erect the steel work for a complete blast furnace, and The William B. Pollock Company is one of them. Over the years Pollock has erected more blast furnaces than anyone in the world. We're specialists in heavy steel work, fully equipped to engineer and fabricate plate and structural requirements and do heavy machine work on castings and weldments.

Pollock engineers are at your service. Use them. They'll analyze your needs and suggest the most practical, efficient and economical solutions.

POLLOCK
Since 1865

The William B. Pollock Co.

YOUNGSTOWN, OHIO

Engineers • Fabricators • Erectors
Steel Plate Construction

BLAST FURNACES • HOT METAL CARS AND LADLES
CINDER AND SLAG CARS • INGOT MOULD CARS
CHARGING BOX CARS • WELDED OPEN HEARTH LADLES

SIMONDS SPECIAL PARTS DIVISION

can make them for you

If you're looking for a dependable source of hardened and ground FLAT STEEL PARTS . . . especially those that require a fine finish and close tolerances . . . then Simonds is your answer.

Simonds Special Parts Division offers you a complete service — from steel of any desired analysis made in our Steel Mill in Lockport, N. Y., to fabrication in our famous Controlled Conditions Plant in Fitchburg, Mass.

Simonds Special Parts Division is fully equipped to produce precision ground, heat treated flat steel parts in any quantity for aircraft engines, printing presses, slitting machines, air compressors and numerous other applications. Clutch, valve and engine discs, spacer rings, slide bars, washers and die plates are other Special Parts Division items. Send inquiries, with full specifications or blueprints, to your nearest Simonds Factory Branch.

Get all these — and more—from SIMONDS

- Heat Treated Discs — all types
- Valve Discs (Compressors)
- Clutch Discs (Multiple Disc Type)
- Aircraft Engine Discs
- Machine Parts (Flat Steel)
- Wear Plates (Ways, etc.)
- Blades — all types — plain — toothed — beveled (for cutting or scraping)
- Circular Cutters for all types of cutting
- Irregular Shaped Cutters — all types
- Heat Treated Liner Plates
- Rectangular Plates — all types

For Fast Service from Complete Stocks Call your **SIMONDS Industrial Supply DISTRIBUTOR**

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon
Canadian Factory in Montreal, Que., Simonds Division: Simonds Steel Mill, Lockport, N. Y., Heller Tool Co., Newcomerstown, Ohio, Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

SIMONDS SAW AND STEEL CO.
FITCHBURG, MASS.

P&H Welding Positioners give you

EXTRA CAPACITY

for BIGGER PRODUCTION SAVINGS

Exclusive P&H design features permit handling greater positioning loads for every dollar you invest

Positioned welding is *downhand* welding, that permits your weldors to use larger, hotter rods for higher deposition rates. This extra welding speed and the savings in handling of weldments cut welding costs as much as 50%.

When economies like this are possible, it pays to get P&H positioners. Size for size, they can handle the widest range of weldments — give you the greatest capacity per dollar invested. The chart below compares the load capacities of positioners in the 3000-lb. class and proves the extra value of P&H.

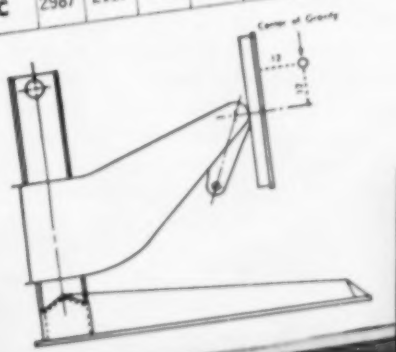
This extra-capacity advantage is found in all sizes of P&H positioners. A free load-capacity table is available to help you select the model best suited to your needs. Just send in the coupon.

HARNISCHFEGER
MILWAUKEE 46, WISCONSIN

3000-LB. MODELS
LOAD CAPACITY COMPARISON CHART

Capacity Shown Below at 12" off center of Rotation and Distances of Center of Gravity of Load from Table.

Positioner	12"	18"	24"	30"	36"	42"	48"	54"	60"
P&H	**3000**	**2510**	**2160**	**1900**	**1690**	**1520**	**1390**	**1270**	**1180**
A	3000	2000	1500	1200	1000	—	—	—	—
B	3000	2250	1800	1500	—	—	—	—	—
C	2987	2187	1725	1424	1212	1056	935	839	760



I'M SMOOTHARC SCOTTY...and I'm always looking for ways to save money. That's why I like the extra capacity of P&H positioners. Our FREE load-capacity table will show you why.

SEND COUPON TODAY FOR FREE INFORMATION

P&H **HARNISCHFEGER CORPORATION**
Welding Division
4411 West National Avenue, Milwaukee 46, Wisconsin

Attention: W. R. Stephens, Sales Manager

Please send me your free load-capacity table covering the P&H Positioner line.

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

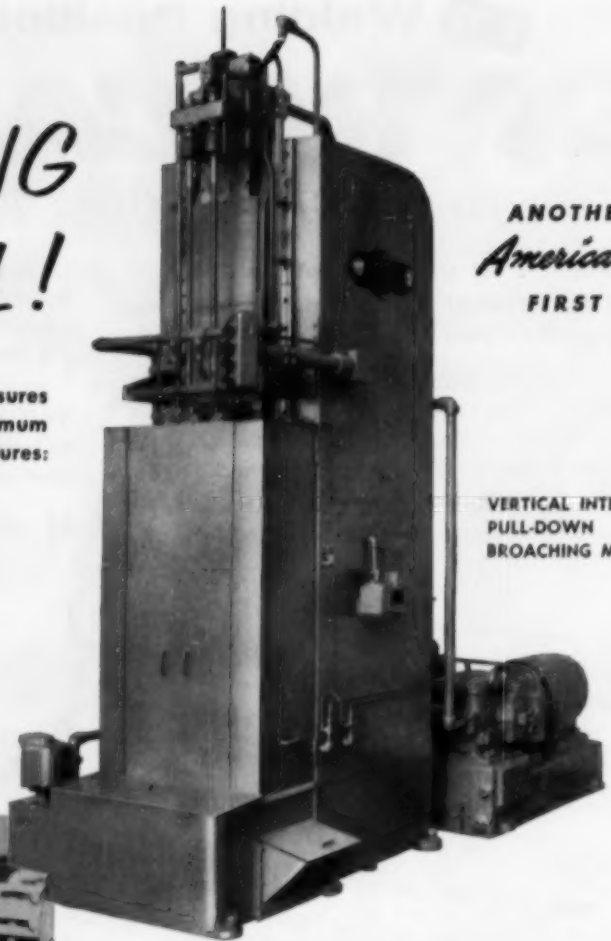
3000

the P&H *Line*

P&H welding equipment is manufactured and sold in Canada by REGENT EQUIPMENT MANUFACTURING COMPANY LTD., 455 King Street West • Toronto, Ontario, Canada

POSITIVE BROACHING CONTROL!

ANOTHER *American* FIRST

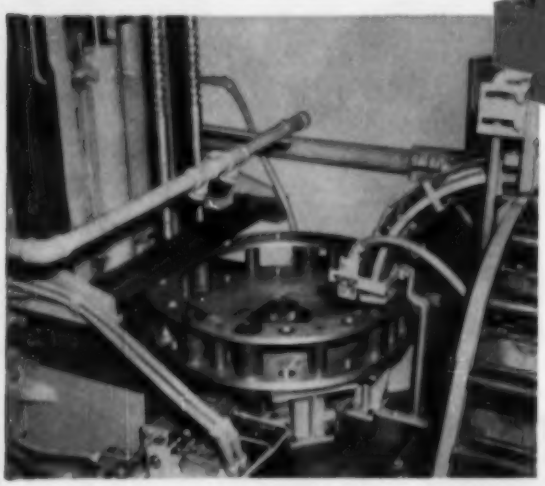


VERTICAL INTERNAL PULL-DOWN BROACHING MACHINE

This NEW American Pull-Down Machine assures high production internal broaching and maximum machine efficiency by these positive control features:

***NEW** retriever unit is built integral with a massive machine slide — provides continuous, rigid broach support through the major portion of the broaching stroke.*

***NEW** chip-free, radially-locked puller design—insures that broaches are locked securely in position before the machine cycle can continue.*



AUTOMATION FLEXIBILITY

Illustrated at the left, the NEW American Pull-Down Machine is tooled for full automation of parts from the floor to the dial-index unit pictured, and on through broaching position to final parts ejection back to the production line. Such automatic components can be added initially or later as individual production requirements demand, and without the usual high cost of special engineering.

The NEW American Vertical Internal Pull-Down Broaching Machine is completely electrically controlled, with all elements interlocked for maximum tooling safety and machine efficiency. High speed production at constantly maintained tolerances becomes a fact through American "Engineered Production."

Write today to see how American can solve your internal broaching problem. Ask for Catalog No. 800.

AMERICAN

American BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

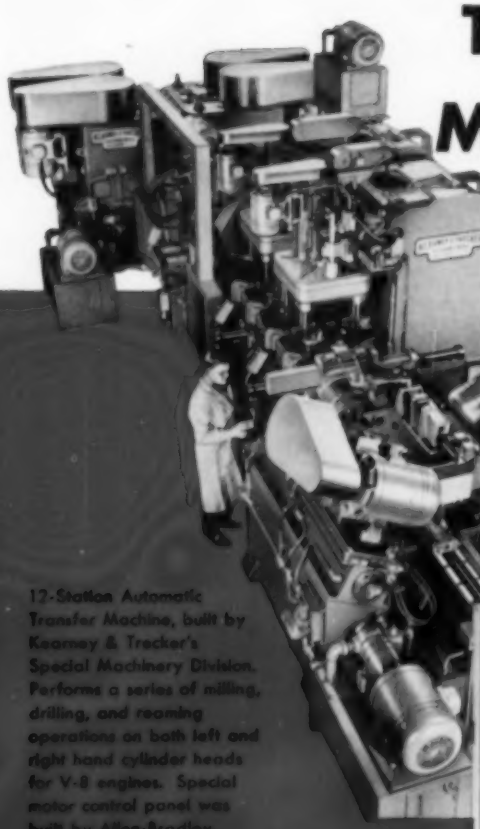
SUNDSTRAND

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

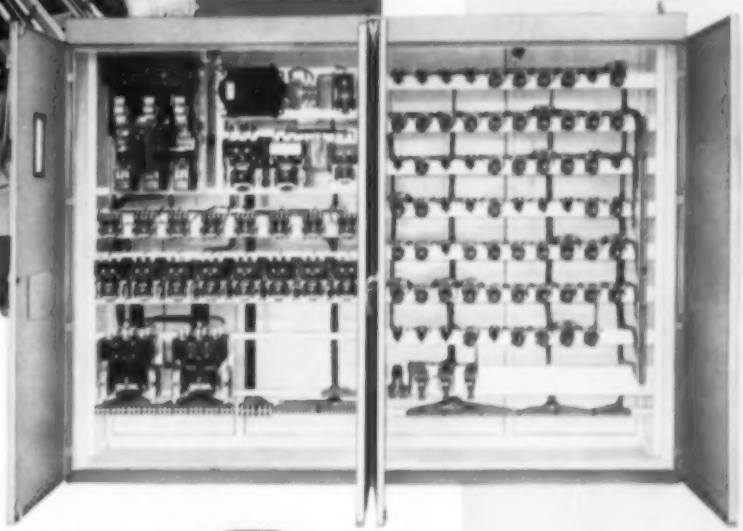
Satisfied Customers

RESULT FROM THE USE OF

Trouble Free Motor Control Panels



12-Station Automatic Transfer Machine, built by Kearney & Trecker's Special Machinery Division. Performs a series of milling, drilling, and reaming operations on both left and right hand cylinder heads for V-8 engines. Special motor control panel was built by Allen-Bradley.



Bulletin 849
Pneumatic Timer

Bulletin 709
Automatic Solenoid Starter

Bulletin 802T
Oiltight Limit Switch

Bulletin 800T
Oiltight Push Button

Bulletin 702
Solenoid Contactor

Bulletin 700
Solenoid Relay

You get two definite advantages when you let Allen-Bradley furnish your special control panels, namely—trouble free, continuous reliability plus ready customer acceptance.

Allen-Bradley control panels are built from standard components whose reliability and maintenance free operation have been proven in many years of service. Their simple design is your guarantee of millions of trouble free operations. The familiar A-B trademark—recognized universally as the sign of QUALITY—is a decided sales asset on your equipment.

Write for your copy of the Allen-Bradley Handy Catalog—the quick and easy reference guide that will help you select individual control units, or components for special control panels.

A-B Quality

ALLEN-BRADLEY

MOTOR CONTROL

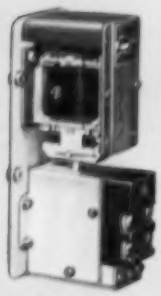
QUALITY

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis

In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

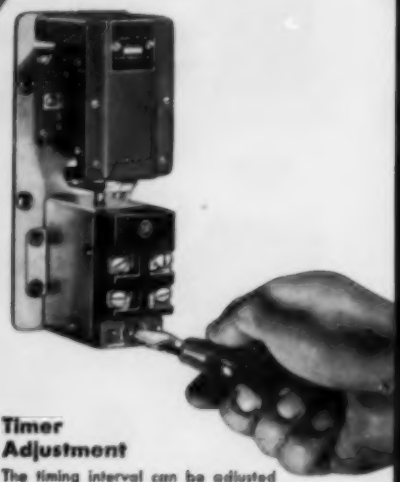
7-56-R

TIMING RELAYS!



Bulletin 849 "On-Delay" timer. By inverting solenoid, timer is converted to "Off-Delay" operation.

Installing instantaneously operated contact block with one N.O. and one N.C. contact



Timer Adjustment

The timing interval can be adjusted quickly and easily by turning the adjusting screw.

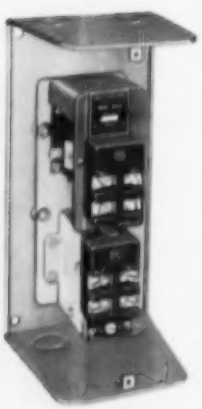
Tell Us About YOUR TIMER NEEDS . . . Allen-Bradley Has the RIGHT ANSWER!

Here is a line of pneumatic timers that can be adjusted for a consistent time delay of 1/6 second up to 3 minutes. Air, drawn into the timer through a needle valve, is freed from dirt and dust down to submicroscopic size by a high efficiency glass fiber paper filter. Thus the time settings are accurately maintained over long periods. These timers can be expected to operate reliably under conditions of severe atmospheric contamination.

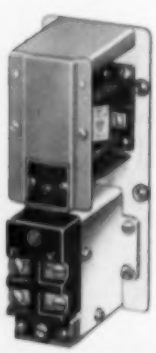
An outstanding feature of these timers is the wide variety of types available, and the modifications which can be made in the field, such as adding one or two instantaneously operated auxiliary contacts. Also, it is easy to change an "On-Delay" timer to the "Off-Delay" operation, or vice versa—by simply inverting the operating solenoid. The "On-Delay" timer provides the time delay *after* the magnetic operating COIL IS ENERGIZED; the "Off-Delay" timer provides the time delay *after* the operating COIL IS DE-ENERGIZED.

The Bulletin 849 timer has one normally open and one normally closed contact. As usual, the Allen-Bradley double break, silver alloy contacts are maintenance free. Auxiliary contacts can be mounted as shown below.

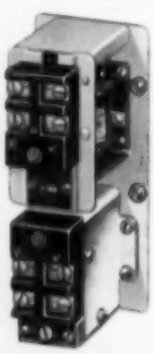
A few typical Bulletin 849 Pneumatic Timer combinations



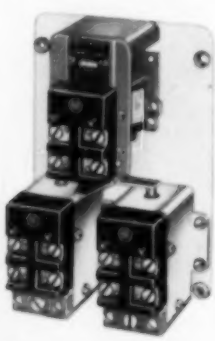
Bulletin 849 timer with one N.O. and one N.C. auxiliary contact.



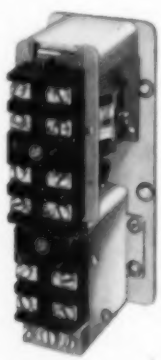
Bulletin 849 "Off-Delay" pneumatic timer with time delay after the coil is de-energized.



Bulletin 849 "Off-Delay" pneumatic timer with one N.O. and one N.C. auxiliary contact.



Bulletin 849 "On-Delay" pneumatic timer with two adjustable timing units.



Bulletin 849 pneumatic timer with two N.O. and two N.C. auxiliary contacts.

Allen Bradley Co.
1316 S. Second St.
Milwaukee 4, Wis.

ALLEN-BRADLEY

PNEUMATIC TIMERS

In Canada—
Allen-Bradley Canada Ltd.
Galt, Ont.

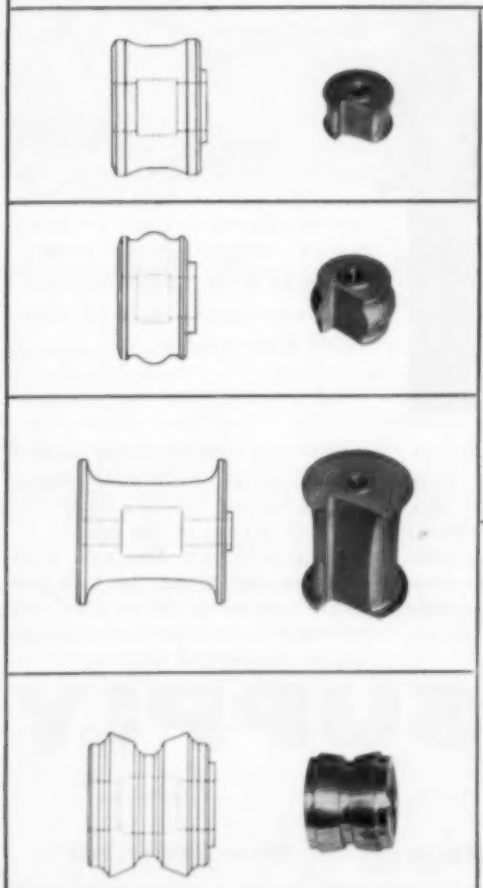
7-56-MR

Machining time—cut 40%!

Grinding time—cut 50%!

Grinding wheel cost—cut 25%!

HERE'S TOP FORM TURNING!



Wouldn't you welcome savings like these? S. K. F. Industries, Inc. does, and their happy secret is shown above in an action shot of their Monarch 16" Series 61 Lathe with Keller controls turning circular form tools from the solid. The figures contrast present against previous production on conventional machines, so widely and wastefully used for this work.

Point is, instead of leaving large amount of stock for final grinding, S. K. F. finds that accuracy of new Monarch with Keller controls enables them to turn and shape directly from the solid within about .0005" of finish size. And less-skilled operators can machine them faster—before less grinding.

You can't miss savings like these! Challenge us to deliver you better production whatever you turn—and prove it . . .
The Monarch Machine Tool Company, Sidney, Ohio

♦ While flat templates are generally employed with Keller controls, S. K. F. achieves the necessary high accuracy by so positioning master work pieces between centers that stylus follows sharp edge of gash in form tool. master. Another savings.

Monarch
TURNING MACHINES
ACCURACY • ECONOMY • LONG LIFE
FOR A BETTER TURN FASTER ...TURN TO MONARCH

Announcing!

"GRADE MARK SERVICE"

a new time-and-money-saving "extra" to users of COLD FINISHED BARS

● "GRADE MARK SERVICE" gives you quick, accurate identification.

● With strapping seal showing grade of each bundle, you save time and trouble in identifying and handling each grade. This is "Grade Mark Service." No need to separate and sort out bars—they are bundled according to grade.

● Another reason why U. S. STEEL SUPPLY is where to buy!

To simplify the identification and handling of cold finished bars . . . to make it much easier for your receiving department to properly stock incoming shipments, we have an entirely new method of bundling and marking the bars you order.

Beginning now, the cold finished bars in your order will be shipped to you in neatly strapped bundles, and each bundle will carry a seal which clearly shows the grade of the bars in that particular bundle. Thus, without altering your stocking procedure in any way, you save time and trouble in identifying and handling each grade. This is "Grade Mark Service."

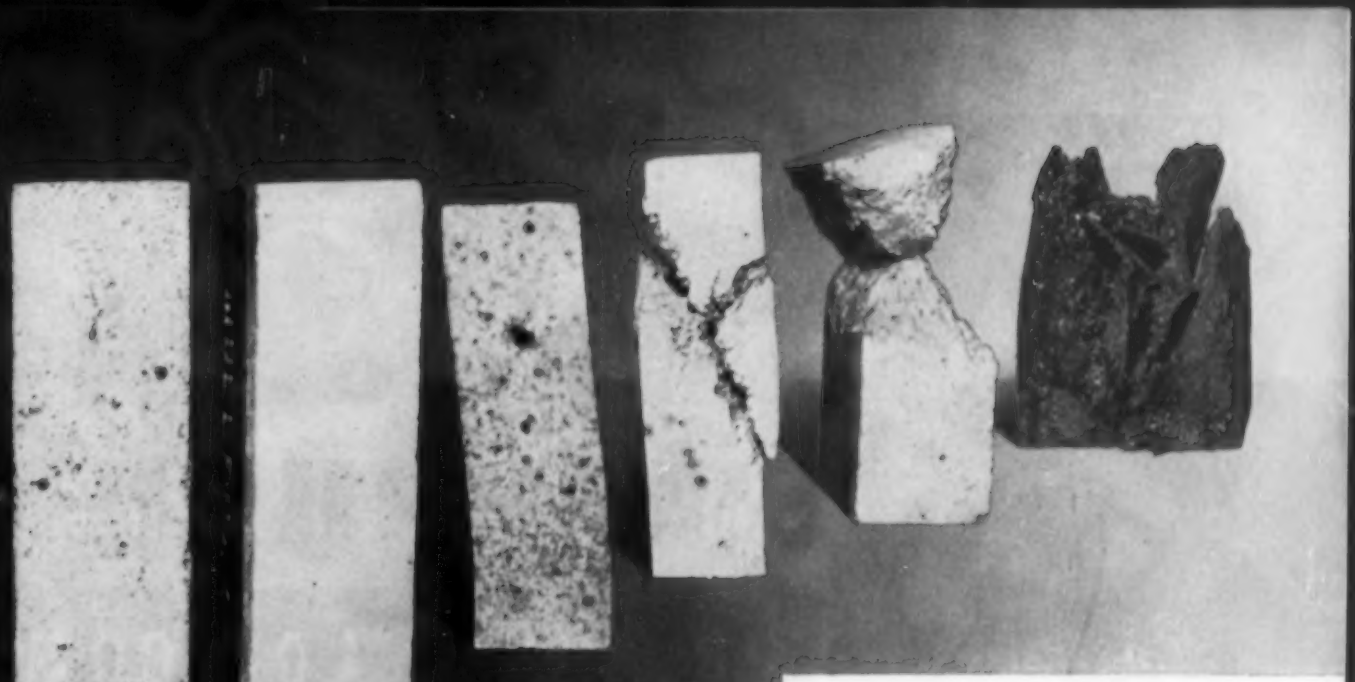
This new and improved method of bundling and marking shipments of cold finished bars is another reason why it pays to buy from U. S. STEEL SUPPLY. One call is all that's needed to get the bars you want. Your order will be filled and shipments made from the warehouse nearest the point of delivery.

U. S. STEEL SUPPLY

DIVISION

General Offices: **208 So. La Salle St., Chicago 4, Ill.** **Warehouses and Sales Offices Coast to Coast**

UNITED STATES STEEL



Comparison of hot strength at 1720° C and 25 psi shows CARBOFRAX® silicon carbide brick undeformed on extreme left, MULLFRAX® brick with only 1.4% contraction, ordinary refractories in various stages of deformation. The one on extreme right failed at 1650° C.

fifth in a series . . .

HOT STRENGTH

Unusual Properties of Refractory Materials

Hot Strength—When load is applied to a refractory its ability to resist heat is lessened. Increasing either load or temperature, or both, often causes the refractory to fail.

As these factors are combined in most installations — large and small — hot strength of a refractory takes on new value.

The effect of temperature in combination with load is shown by specimens pictured above. Further tests provided these data: In a test under 50 psi, a MULLFRAX® electric furnace mullite brick showed no linear contraction when held at 1500°C for 100 hours. Ordinary brick contracted an average of 7.58% at 1500°C but that at only 35 psi. In another typical case complete failure (15% contraction) was experienced with a commonly-used refractory at 1350°C and a load of 25 psi.

These differences in hot strength prove this: Where refractories fail under load and temperature, Carborundum refractories have the *extra* resistance needed to avoid slumping and, thereby, to effect less downtime, lowered maintenance costs and greater output.

Hot strength may work in another way, too. It permits use of thinner section refractories, thus reducing overall load. More insulation may be used to lower heat losses.

Carborundum's magazine "Refractories" pinpoints many practical applications for these unusual products. The next issue carries a feature article on "hot strength". Send for your copy today.

CARBORUNDUM

Registered Trade Mark

VALUABLE INFORMATION FOR USERS OF:

REFRACTORIES • CASTABLE CEMENTS • POROUS PLATES AND TUBES

CATALYST SUPPORTS • OXIDE, BORIDE, NITRIDE AND CARBIDE

HIGH-TEMPERATURE MATERIALS • CERAMIC FIBER

all in the new magazine "Refractories"

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Dept. W106, Refractories Division
The Carborundum Company, Perth Amboy, N. J.

Please send me the forthcoming issue of "Refractories".

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Phosphate Coated
MUSIC WIRE

. . . especially merits your careful investigation if you are interested in superior uniformity of PHYSICALS. This wire amazes the Spring Manufacturer when he tries it on his most difficult jobs.

A trial order will convince you.

108

WASHBURN WIRE COMPANY NEW YORK CITY

WASHBURN

CLEAN, UNIFORM BILLETS – STRIP – RECTANGULAR, ROUND, FLAT RODS
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES

Seven Products Replace Twelve. Sun representatives show how Sun's plan of industrial lubrication and preventive maintenance benefit management.

Over 70% of all plant equipment is now lubricated by only two moderately priced oils.

How A Sun Engineer Helped Cut Lubrication Costs by 15%... Reduce Oil Inventory by 42%

Maintenance Is Easier. Sun's plan helps prevent mistakes... reduces chances of applying wrong lubricant.

For years, department foremen of a large folding box plant purchased "special" lubricants to meet individual needs. Throughout the plant, a total of twelve products were being used...some extremely high in price.

The man from Sun called management's attention to this fact. He pointed out that much of the plant equipment, although different in name and function, was mechanically the same. He proved that over 70% of the equipment could be lubricated by two products instead of several lubricants basically alike.

Today, as a result of Sun's recommendations, "special" lubricants are gone; costs of lubrication are down 15%; and, oil inventories are reduced by 42%.

For the full story about how Sun can simplify lubrication setups and save on oil costs...see your Sun representative or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. S-10.

SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

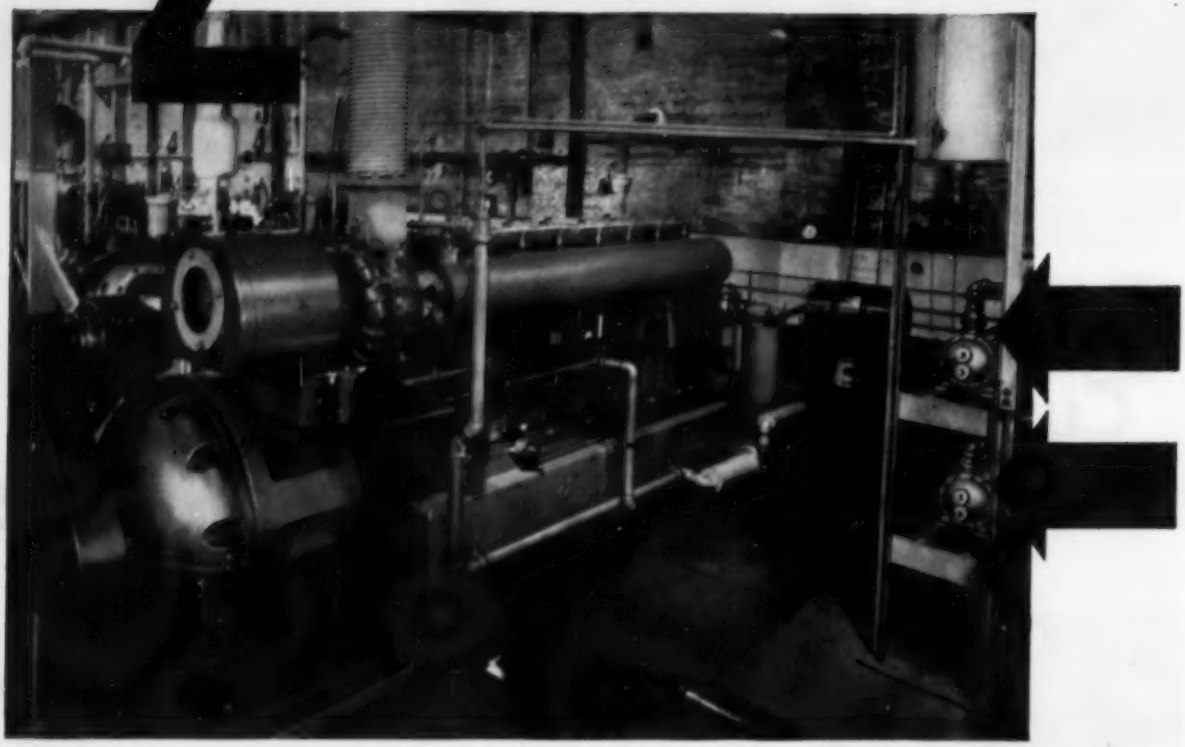
SUN OIL COMPANY

PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

2 ROSS EXCHANGERS

keep this CP Diesel "temperature-right" for smelting plant service



On duty in a smelting plant, this CP Diesel Generator Set not only compensates for variations in furnace demands, but serves as a standby source of power in the event of boiler failure.

Safeguarding its performance are two Ross Type BCF Exchangers. Both lube oil and jacket water are dependably cooled at all times, holding engine temperatures at desired operating level.

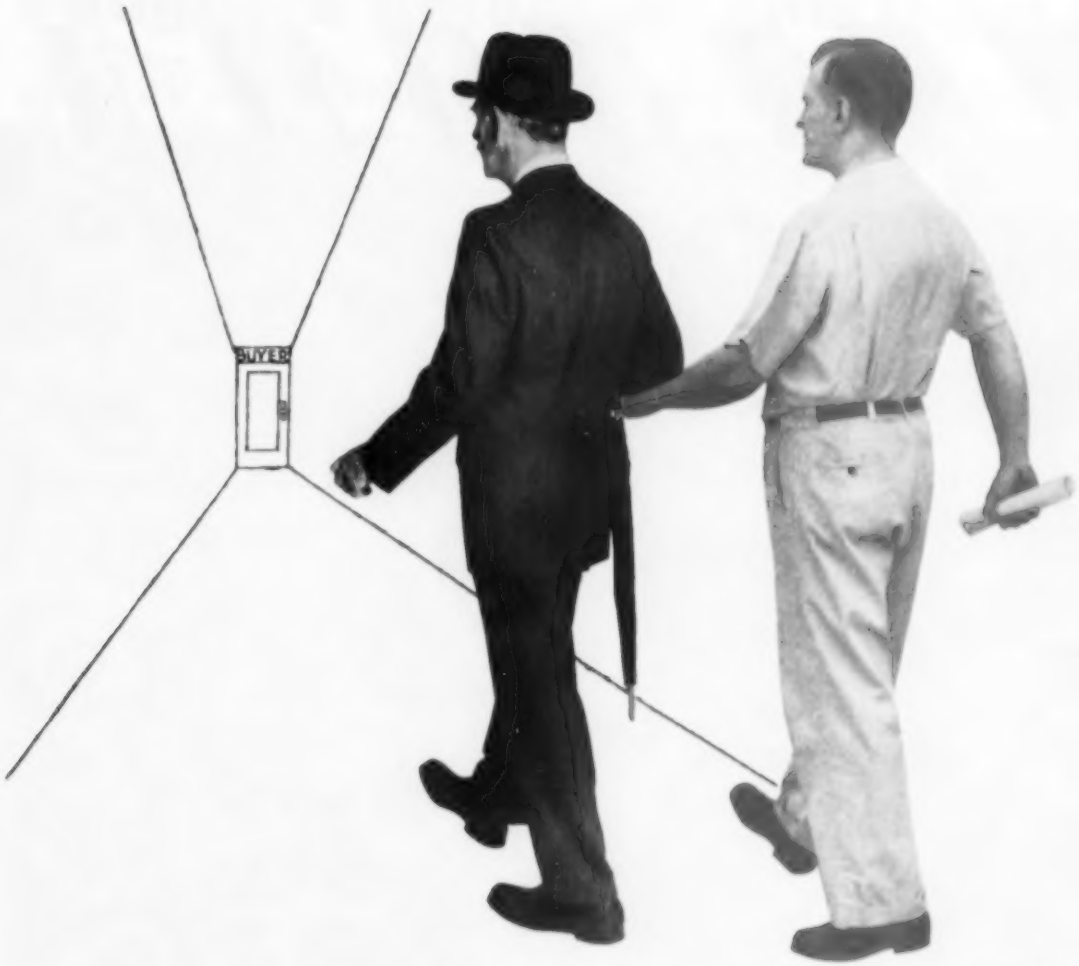
Says Chicago Pneumatic Tool Company, "Our engineering and sales departments are fully aware of the merits of Ross Exchangers . . . installation is frequently the result of customer preference."

Throughout industry, Ross Exchangers are favored by both users and builders of numerous types of prime equipment to cool oil, water, air, gas and hydraulic fluid. Pre-engineered and fully standardized in sizes to meet a broad range of requirements, they're unsurpassed for thermal efficiency and ruggedness.

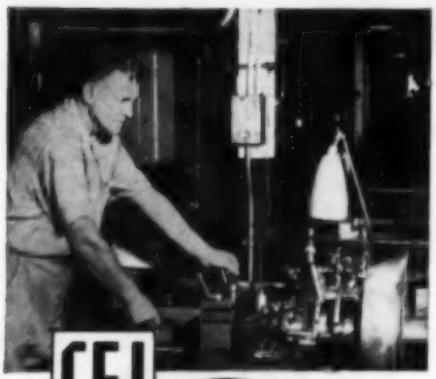
For detailed information, request Bulletin 1.1K5. Ross Heat Exchanger Division of American-Standard, Buffalo 5, N. Y. In Canada: American-Standard Products (Canada) Limited, Toronto 5, Ont.

ROSS

ROSS HEAT EXCHANGER PRODUCTS



Your Wickwire Rope Distributor and our closer operator ...ready to help you



This closer operator—running a machine which forms our rope—is with your Wickwire Rope Distributor every time he makes a call.

True, he's physically in the mill, where he's carefully conducting this final fabricating operation. But, whenever your Wickwire Distributor makes a call, he has the full assurance that every foot of Wickwire Rope has been carefully assembled by skilled craftsmen . . . and that it will give you long, trouble-free service on your job.

It's just one more reason why your Wickwire Distributor knows he's got top-quality wire rope, slings and strand to sell . . . and that these products will serve you well.

CF&I WICKWIRE ROPE A CF&I PRODUCT

4065

A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION

A HANDFUL OF CHIPS...

tells the COST-CUTTING story of Chase® FREE-CUTTING Brass Rod!

Take a close look at the typical chips machined from Chase Free-Cutting Brass Rod. See how short, brittle and tightly curled they are. They could only have come from rod that permits really high cutting speeds and heavier feeds *without gumming or jamming!*

Such remarkable chips also indicate the *quality at low-cost* of *finished pieces* machined from Chase Free-Cutting Brass Rod. Smoother, cleaner pieces that take precision threads and sharp knurls—require less polishing—and simplify lacquering, enameling or plating.

The Chase warehouse near you stocks standard mill lengths in many different cross-sections. Special shapes that *save even more* machining time can be made to order.

Write, wire or phone today!

Chase

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Pangborn Rotoblast® cuts labor costs 33% at Commercial Steel Castings!

The Pangborn Rotoblast Room at Commercial Steel Castings Co., Marion, Ohio, has speeded production to the point where three round-the-clock shifts have been cut to two—a savings of 33% in labor costs alone!

You save on labor costs *two* ways when you blast clean with Pangborn Rotoblast. For one thing, Rotoblast's faster cleaning gives you more production per man-hour. This eliminates overtime, cuts down your work force . . . often permitting the reduction of two or even three shifts to just one.

In addition, the automatic operation of Pangborn Rotoblast frees your working men for other tasks during the actual blasting process. Lower labor costs, faster production, less maintenance, high-quality cleaning—these benefits mean *lower cost per ton of castings cleaned,* and make it well worth your while to investigate Pangborn Rotoblast for any blast cleaning problem. For complete details, write for Bulletin 227 to PANGBORN CORPORATION, 1600 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

Visit our Booth 1901, National Metals Show, Cleveland, October 8 to 12

And saves McCallum Bronze $3,400 a year in manpower!

The Pangborn Rotoblast Blastmaster® Barrel at McCallum Bronze Co., Buffalo, N.Y., has *cut cleaning time 80%.* The resultant reduction in man-hours saves the firm $3,400 a year!

Pangborn

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Rotoblast® Tables & Table-Rooms

Special Blast Rooms & Cabinets

Pangborn Dust Control Equipment

Distributors for Malleabrasive and Tru-Steel Abrasives

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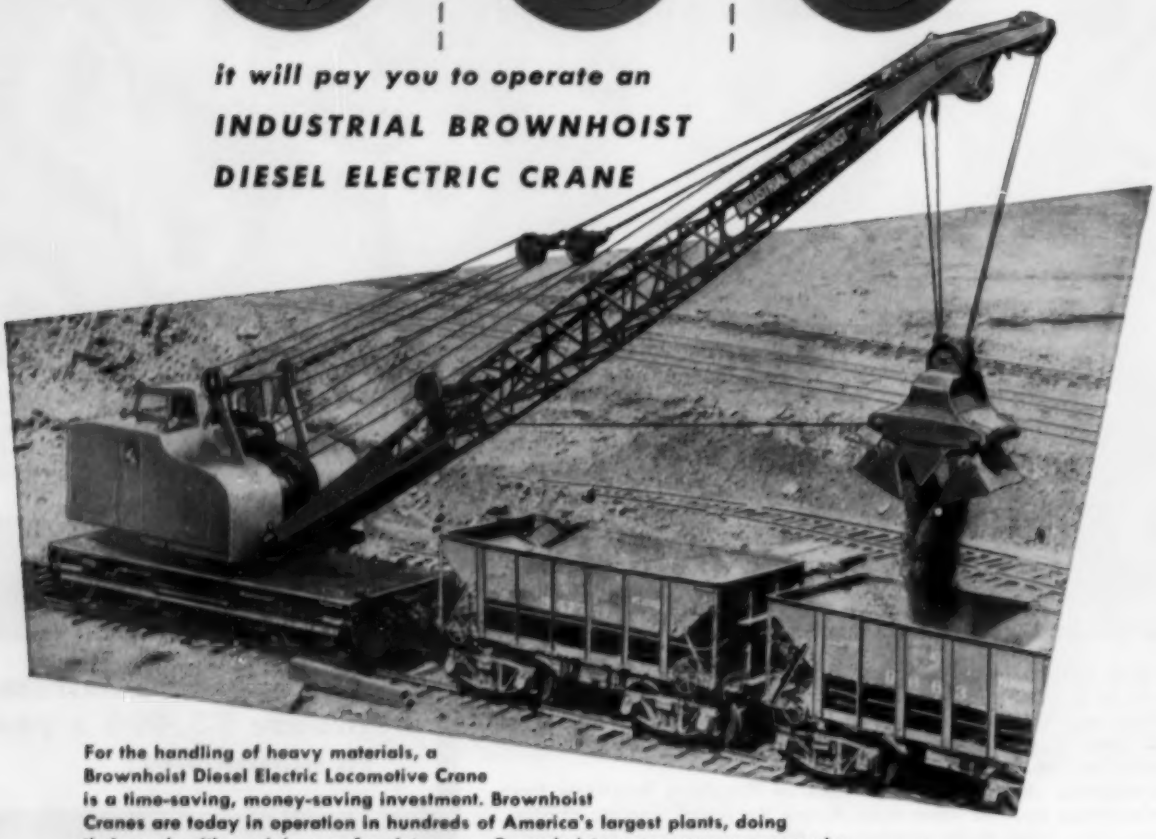
FOR LOW COST HANDLING OF HEAVY MATERIALS IN QUANTITY WITH

magnet | **hook or** | **bucket**

it will pay you to operate an

INDUSTRIAL BROWNHOIST

DIESEL ELECTRIC CRANE



For the handling of heavy materials, a Brownhoist Diesel Electric Locomotive Crane is a time-saving, money-saving investment. Brownhoist Cranes are today in operation in hundreds of America's largest plants, doing their work with a minimum of maintenance. Brownhoist cranes can save money by doubling as switch engines. They haul up to 7 or 8 loaded cars on straight and level track. All Brownhoist machines possess the famous Straight Line Power Train, which means you get the smoothest and most efficient crane operation. Brownhoist cranes give your operator greater visibility through the patented Monitor Type Cab and Clear Vision Boom, allowing him to work faster and with more safety. Electric swing available at extra cost on all models. Industrial Brownhoist Diesel Electric Locomotive Cranes are available in capacities from 25 to 100 tons. Write for Catalog No. 548.

192

BROWNHOIST MATERIALS HANDLING EQUIPMENT GIVES A LIFT TO AMERICAN INDUSTRY

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BAY CITY, MICHIGAN • DISTRICT OFFICES: New York, Philadelphia, Cleveland, Chicago, San Francisco, Montreal
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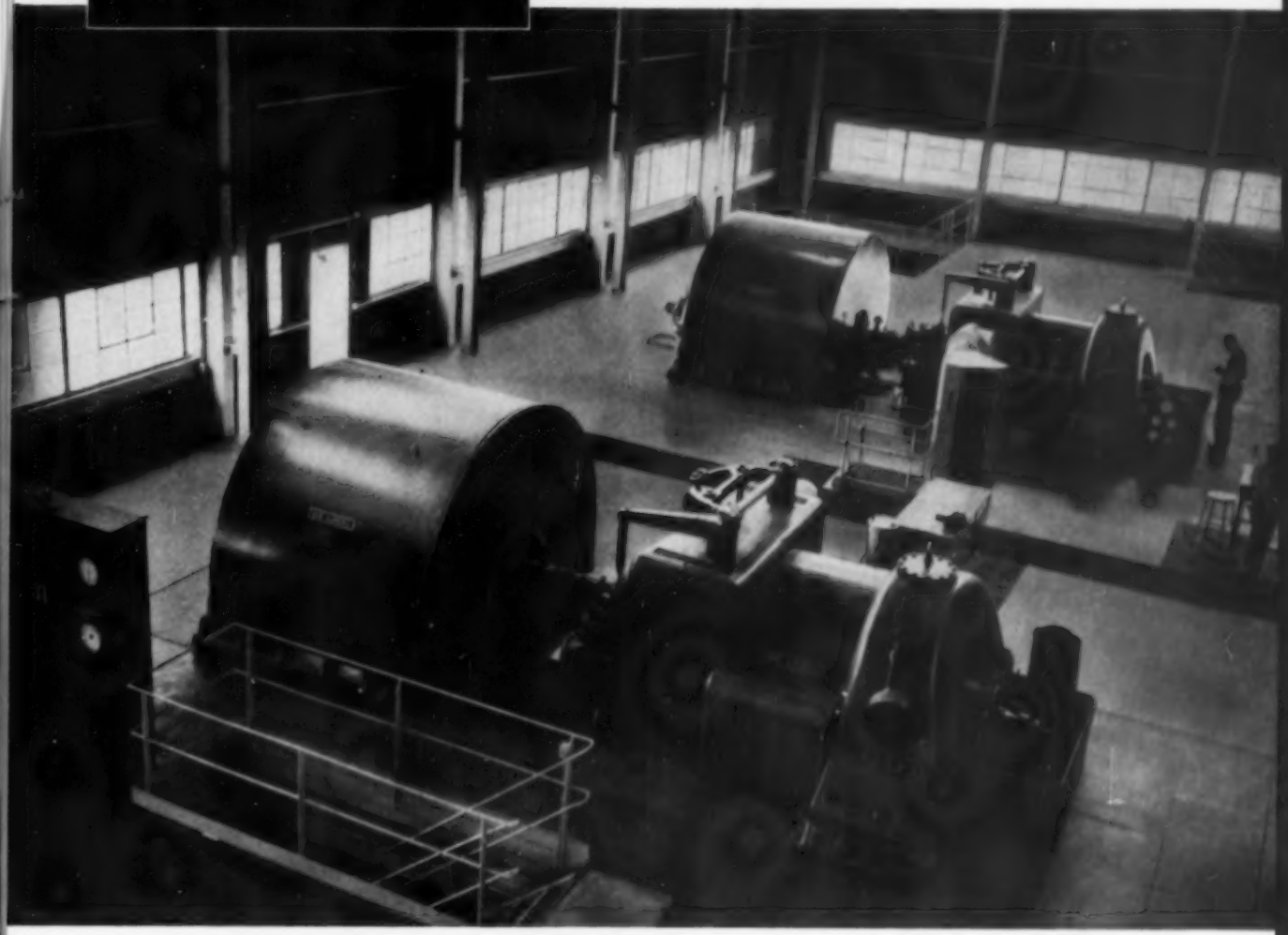
SUBSIDIARY OF Ross-Texas

BROWNHOIST

DE LAVAL

BLAST FURNACE BLOWERS

deliver 110,000 cfm each for McLouth Steel



These two De Laval turbine-driven centrifugal blowers do a round-the-clock job in the McLouth Steel plant, Trenton, Michigan. Each has a rated capacity of 110,000 cfm of air; discharge pressure is 30 psig. Each is driven by a 12,400 hp, 2950 rpm De Laval steam turbine operating under steam conditions of 600 psig, 825 F with 2″ hg.

De Laval compressors are designed individually for each application to assure maximum efficiency and range of operation. Construction is rugged throughout. Casings and perfectly balanced rotors are built to take punishment. All parts are precision-made to limit gages. Materials are selected which will best meet the particular conditions of corrosion, pressure and temperature.

De Laval centrifugal blowers are built in single and multi-stage types to supply air in volumes up to 150,000 cfm for all classes of service in steel, gas and coke plants. The wealth of application experience acquired by De Laval over the years assures a correct and economical solution to your blower problem.

Send for Bulletin 0504

DE LAVAL *Centrifugal Blowers*

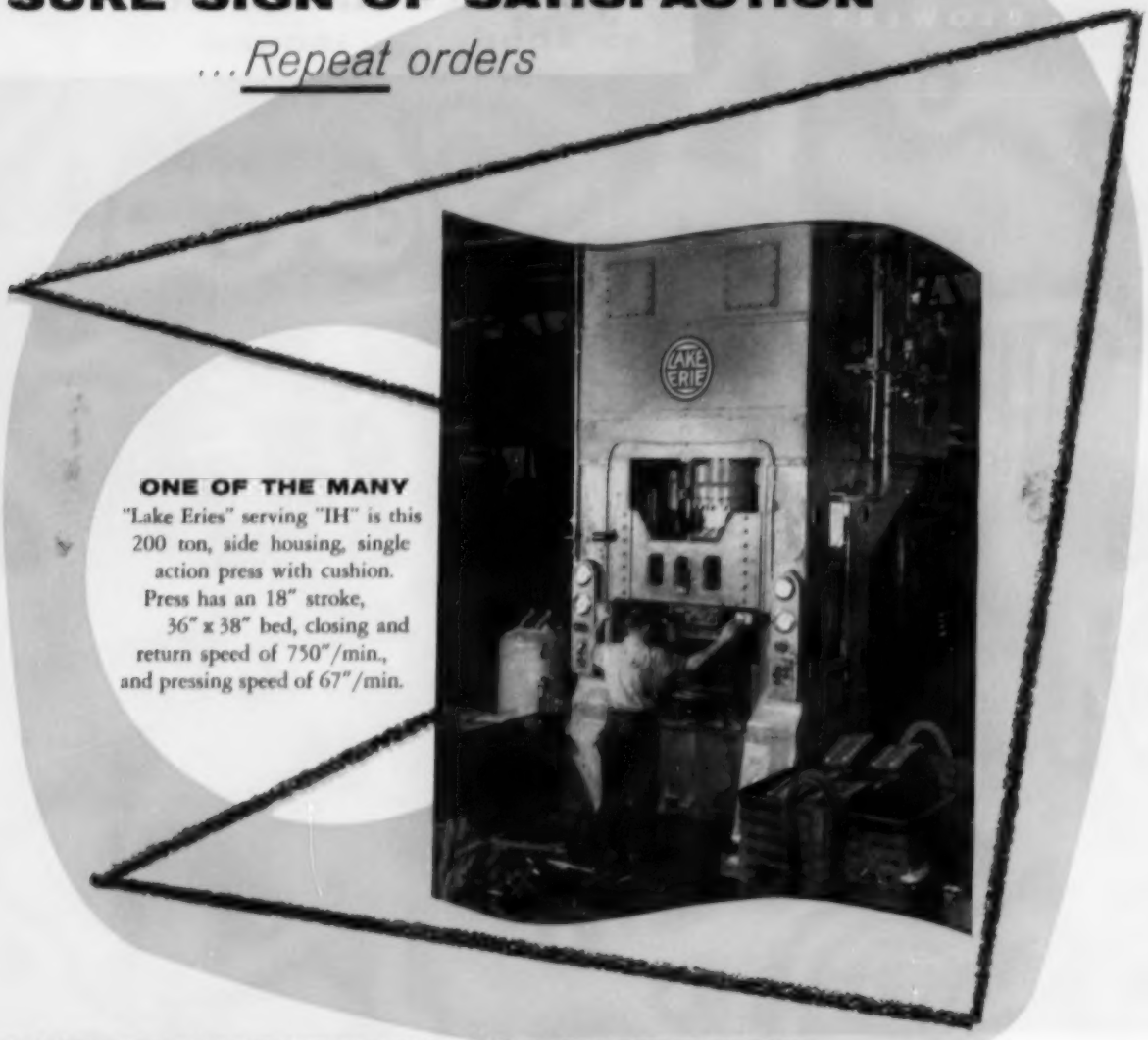
DE LAVAL STEAM TURBINE COMPANY

860 Nottingham Way, Trenton 2, New Jersey

DL 560

SURE SIGN OF SATISFACTION

...Repeat orders



ONE OF THE MANY
"Lake Eries" serving "IH" is this 200 ton, side housing, single action press with cushion. Press has an 18" stroke, 36" x 38" bed, closing and return speed of 750"/min., and pressing speed of 67"/min.

INTERNATIONAL HARVESTER

has re-ordered from Lake Erie **19 TIMES**

International Harvester Company ordered their first press from us in the early 40's . . . have added 21 more Lake Erie presses since then . . . and have a current order on our books. Drawing, forging, hot forming, bending, quenching and straightening are some of the many production operations performed by International Harvester with their Lake Erie presses.

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ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

LAKE ERIE ENGINEERING CORP.

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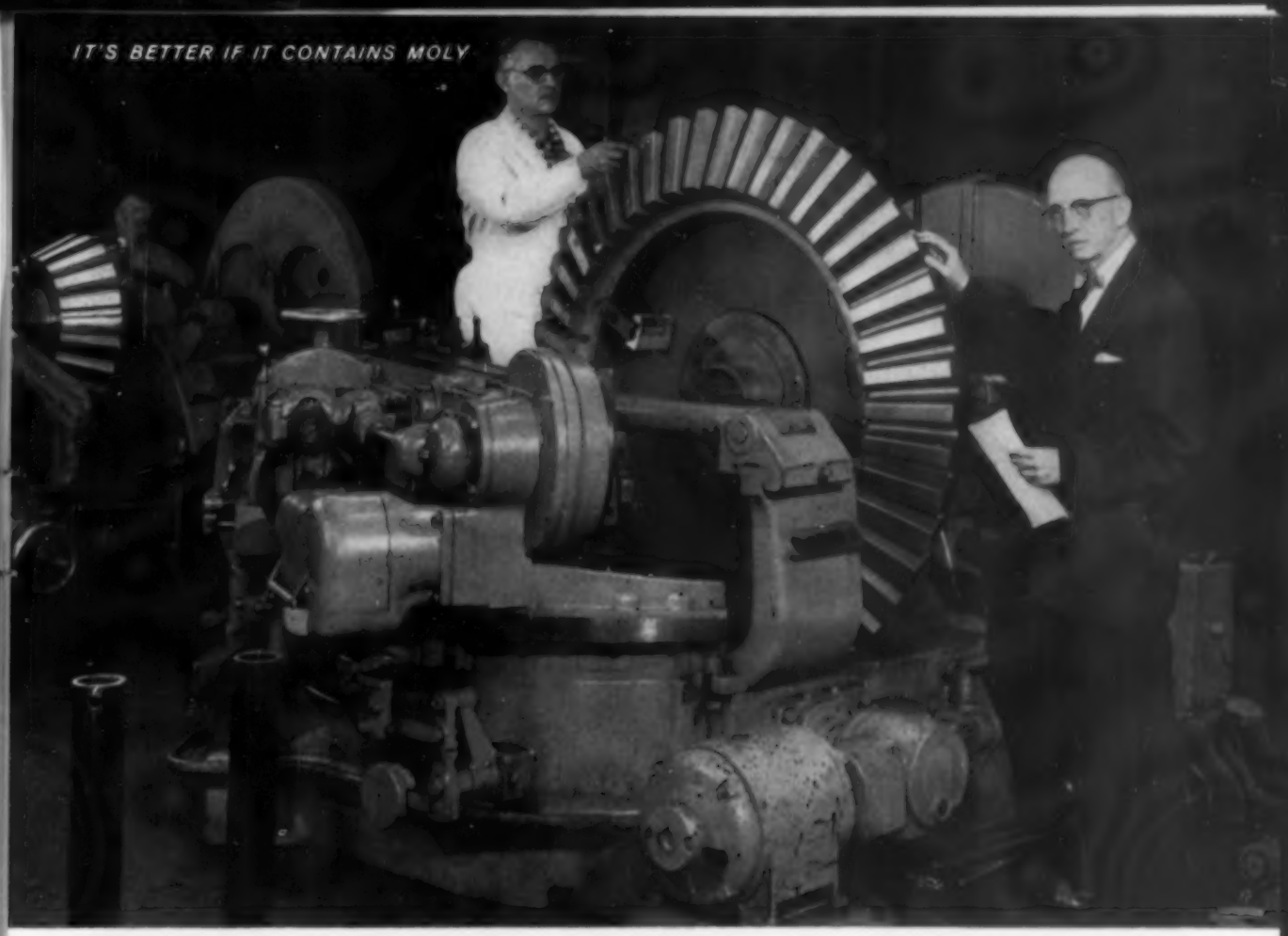
LAKE ERIE® ● Manufacturers of die casting machines and the most complete line of hydraulic presses for all industry.



E. B. Smiley, Metallurgist for Illinois Gear & Machine Co., looks over setup of large, heavy duty bevel gear made from molybdenum alloy steel casting. This gear has been rough turned, rough cut and heat treated to 269 to 302 Brinell before finish cutting.

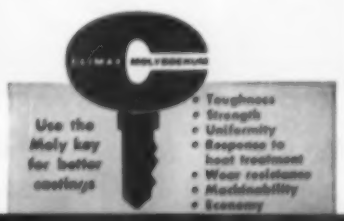
For Strength, Hardness and Machinability gear maker recommends Molybdenum Alloy Steels

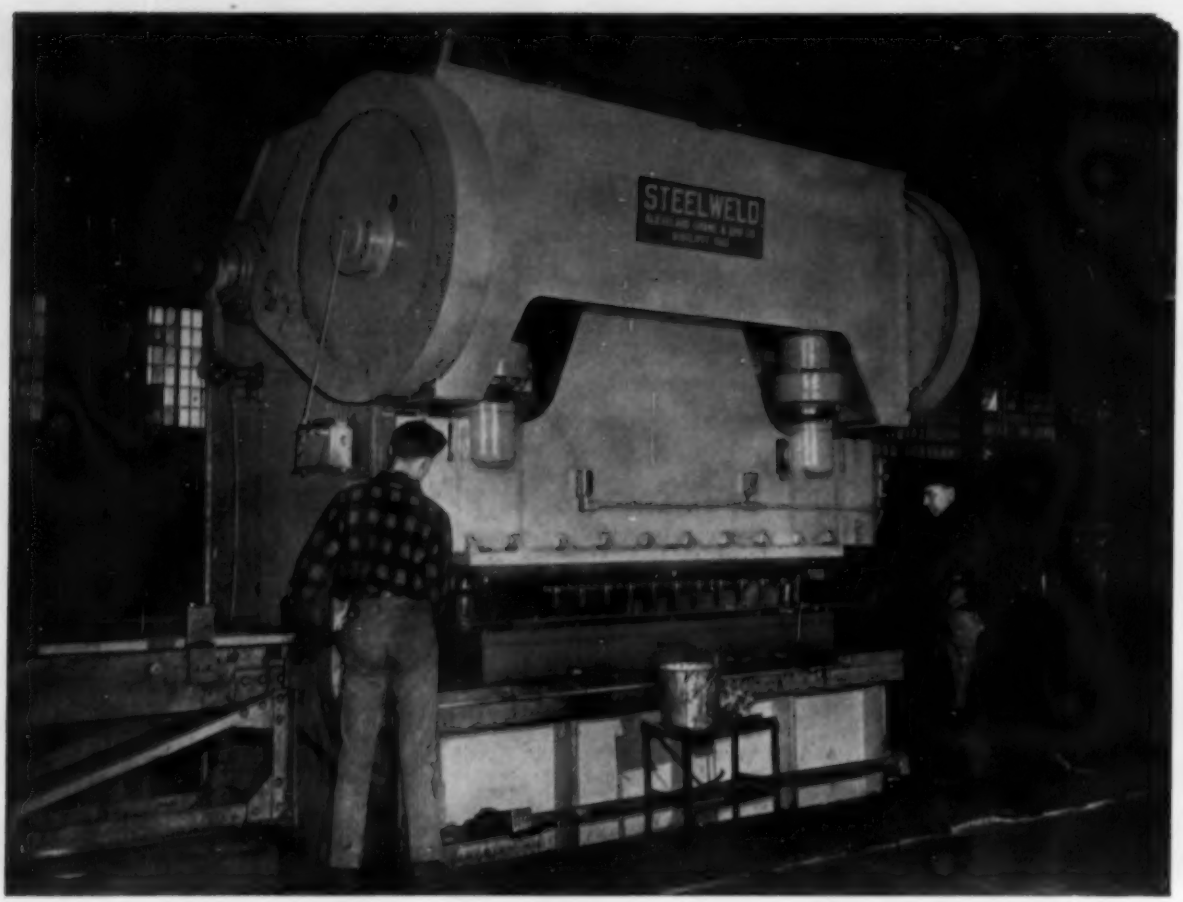
"All of our gears are made to customer specifications, and in many cases these include the use of molybdenum steels," says Mr. Smiley, metallurgist for Illinois Gear & Machine Co. "When our customers specify heat-treated gears of plain carbon steel," Mr. Smiley continues, "we often recommend that they change to 4140 alloy containing molybdenum to achieve high strength and hardenability with good machinability."

Moly steels offer gear users many advantages over carbon steel. Their greater strength and toughness permit the use of smaller weight-saving gears to transmit a given amount of power. Reduced weight and size of gear housings and other components add to the economy of moly steels. And their higher endurance is an important safety factor.

The properties of moly steels are discussed in a new booklet "Moly Steels for Cast Gears". Full technical assistance is also yours for the asking. Write Climax Molybdenum Co., Dept. 3, New York 36, N. Y.

CLIMAX MOLYBDENUM





Model ES-8 Press, one of two Steelwelds in continuous 24-hour service since 1945, punching a series of holes in bridge floor bars.

2,000 Bars slotted every 8-Hour shift

Although originally conceived as machines for bending metal, Steelweld Presses are now serving a wide variety of uses. Two large Steelwelds at the MacDonald, Ohio Plant of the Carnegie-Illinois Steel Corporation are used solely for punching slots in steel bars, beams and T-sections for bridge flooring.

The time of one press is devoted largely to punching slots in bars 1⅝" and 1-7/16" wide by ¼" thick by 6'-2" long. Each bar contains 13 slots ½" wide by ⅝" to ⅞" long, and 24 slots ¼" wide by ⅝" to ⅞" long, a total of 37 slots all punched at one time. Two thousand bars are slotted in an eight hour shift.

Another standard job is that of punching 2-inch long slots on 4-inch centers in I-beams for bridge sections. These are punched 24 at a time. The beams vary in length from 24'-0" to 45'-0". Two hundred 40'-0" beams are punched in an 8-hour period.

Both Steelweld Presses have been in this service 24 hours a day since 1945.

GET THIS BOOK!

CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO

7832 EAST 281st STREET, WICKLIFFE, OHIO

STEELWELD

BENDING PRESSES

BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

2,370 lb.

FERROUS

FORGING

CAMERON'S SPLIT-DIE FORGING PROCESS

makes possible a saving in machining time plus a better grain structure in this launching valve body. High quality alloy steel press-forgings with both internal and external contours are produced by Cameron in a great variety of sizes and shapes.

Weight in these forgings is from 200 to 5,000 lbs. but design possibilities of surface and mass have made such a break with past practice that often we are asked, "Is this a forging?"

For information about the unusual advantages of these unusual forgings, write or call . . . .

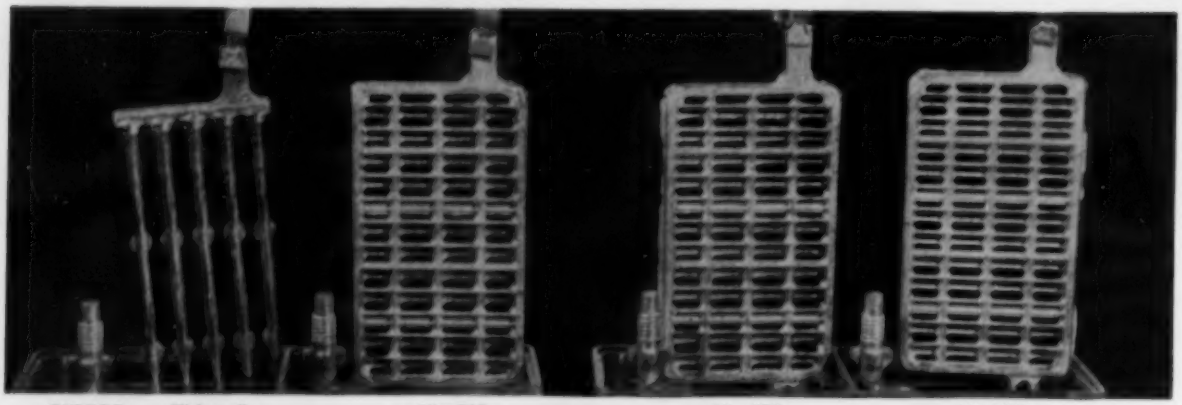
Cameron

IRON WORKS, Inc.

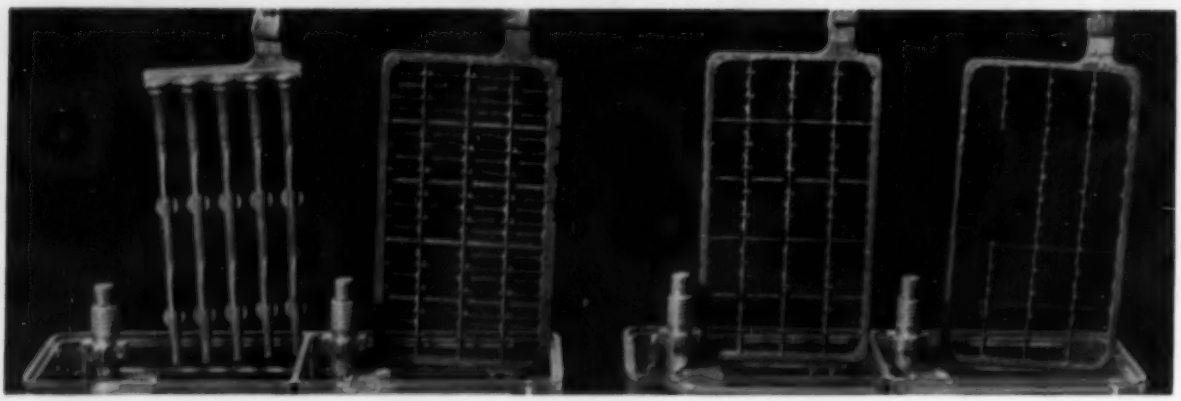
SPECIAL PRODUCTS DEPARTMENT
P. O. Box 1212, Houston, Texas

EXIDE-IRONCLAD BATTERIES

For electric industrial truck operation



BEFORE: Silvium alloy — Alloy "A" — Alloy "B" — Alloy "C"



AFTER: Note how the Silvium grid resisted corrosion. Compare it with the other alloys.

Corrosion resistant SILVIUM prolongs battery life

BATTERY FOR ELECTRIC INDUSTRIAL TRUCK, Model TH. Fits snugly into space provided on truck. Has tubular construction of positive plates, Silvium grids, "Permanized" negative plates, extra heavy connectors and all other Exide-Ironclad advantages that mean power to spare in heavy duty applications. Write for Bulletin 5161.

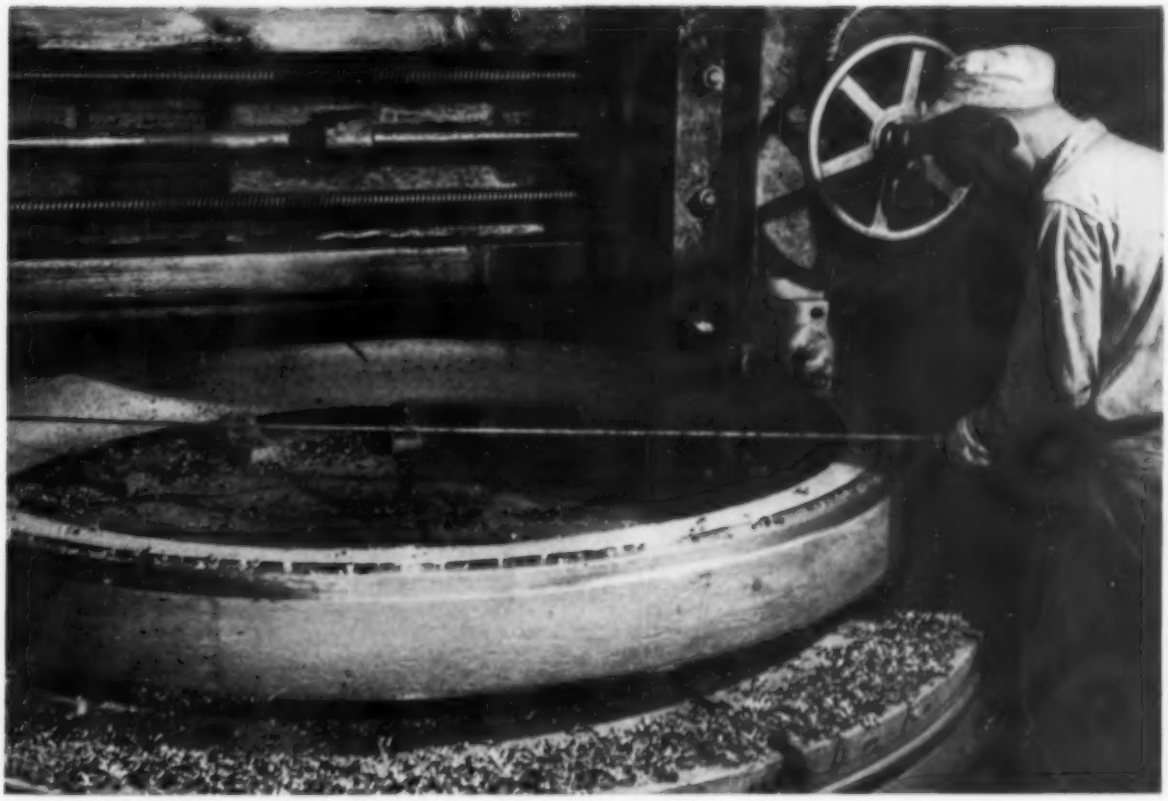
Reaching down deep into every Exide-Ironclad Battery are the fingers of Silvium alloy metal which form the grids of the famous Exide-Ironclad positive plates.

Silvium is a special alloy developed by Exide to resist corrosion and thus prolong battery life. For proof, Exide research engineers compared the performance of an Ironclad Silvium grid side by side with ordinary grids of other lead alloys. As the photographs above show, only Silvium came through the test without damaging corrosion—undiminished in size, unimpaired in strength. The other grids showed from moderate to severe corrosion.

Tests have proved that Silvium is not only more resistant to corrosion, but also a better conductor of electricity. Hence it both prolongs battery life and —because there's less internal battery resistance—more readily permits heavy drafts of power.

This special material is only one of the many exclusive features which have made Exide-Ironclad Batteries world famous for high capacity and long life. When you order batteries for heavy duty applications, or the equipment requiring such batteries, be sure to specify Exide-Ironclad. Write for detailed bulletin. Exide Industrial Division, The Electric Storage Battery Company, Phila. 2, Pa.

Exide®



Here's proof of Hi-Qua-Led's performance in ALCO seamless forged and rolled rings:

"Roughing cuts reduced by ½
. . . cutter costs by ⅓
. . . running time by 12¼ hours
. . . surface finish: greatly improved"

Tremendous savings in machining time and reduced tool costs are reported by our ring customers who have used ALCO's new Hi-Qua-Led Steel*. Here's what one customer reports:

"The leaded steel machined successfully using half the normal number of roughing cuts and at greatly increased speeds. Surface finish was greatly improved. Normal surface finish on 4140 steel was from 80 to 125 rms, while surface finish on the two test gears was from 40 to 60 rms. Total running time per gear was reduced by 12.18 hours. Cutter costs were reduced by approximately one-third."

Make the comparison right in your own shop. Let ALCO furnish you a trial lot of Hi-Qua-Led steel rings along with your usual grade. See the advantages it brings in faster machining, with less power, reduced tool wear. Hi-Qua-Led may be obtained in any size ALCO forged ring. For complete information contact your nearest ALCO Sales Office.

Other customer tests of Hi-Qua-Led's machinability are equally impressive:

- **41L37 — Brinell Hardness 290-330**

  Turning — Speed increased from 2¾ rpm to 6 rpm. Depth cut: from ¼ in to 3/16 in. Machining time improved: 69 per cent.

  Teeth-Cutting — Tool life increased 1600 per cent. Tool wear decreased 95 per cent.

- **41L40 — Brinell Hardness 285-302**

  Turning — Speed increased from 17 rpm to 25 rpm. Machining time improved 47 per cent.

  Teeth-Cutting — Tool life increased 427 per cent. Tool wear decreased 77 per cent. Machining time improved: 41.2 per cent.

Your copy of "Facts on Leaded Steel for Seamless Forged and Rolled Rings," is waiting for you. Just write ALCO Products, Inc., P. O. Box 1065, Schenectady 1, New York.

ALCO

ALCO PRODUCTS, INC.
NEW YORK

Sales Offices in Principal Cities

*Trade-mark Reg. applied for. Patent applied for on lead-addition method.

Locomotives · Diesel Engines · Nuclear Reactors · Springs · Steel Pipe · Forgings · Oil-Field Equipment

or solid

a steel tube or bar for every purpose

TUBING: SEAMLESS AND WELDED

Whatever your tubing requirement—whatever kind and quantity you need—you can get quick delivery of a quality product with a single call to Ryerson.

That's because Ryerson stocks are the nation's largest, including more types and sizes, more tonnage, than any other source. And Ryerson service facilities are unequalled, too.

Hack saws, band saws and equipment for production lathe cutting and chamfering assure quick service on your orders. In addition, a staff of tubing specialists puts years of experience to work on your problems of tubing selection and fabrication. So call Ryerson for everything in tubing and tubing service.

In stock: Cold drawn and hot rolled seamless mechanical tubing, hot and cold rolled welded tubing, hydraulic and cylinder tubing, structural tubing, etc.

COLD FINISHED BARS

Careful handling, accurate cutting, vigilant inspection—these are just three of many ways in which Ryerson assures you of the highest quality in cold finished bars.

Stored in temperature-controlled rooms, spark-tested to guard against mixed steels, Ryerson cold finished bar stocks include rounds, squares, hex's, flats—screw steel, accuracy stock, turned, ground and polished shafting, Ledloy for fastest machining—everything you need. And even the hard-to-get intermediate sizes are on hand.

To help you select the best cold finished bar for each application, we have just published a simplified guide showing the comparative strength, cost, machinability, workability, etc. of all commonly used types. Write for your copy and call Ryerson when you need high quality cold finished bars.

RYERSON STEEL

In stock: Bars, structurals, plates, sheets, tubing, alloy and stainless steel, reinforcing bars, machinery & tools, etc.

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI • CLEVELAND
DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

STEEL

October 8, 1956

Metalworking Outlook

Tax Write-off Decision Postponed

The decision about granting fast tax amortization for steel expansions has been postponed until the end of the year or early 1957. By then, the Defense department will have decided upon new mobilization requirements on which it is working. The awarding of any new fast write-offs to other industries not now eligible will also be held up until the Pentagon states what it will need. Steel firms seek tax aid on some $1.5 billion worth of expansion projects.

Record Earnings Ahead

Look for record earnings in this fourth quarter. Profits for all manufacturing corporations should exceed $4.2 billion in October, November and December. A report by the Securities & Exchange Commission and Federal Trade Commission reveals manufacturing profits hit $4 billion in the second quarter, $3.8 billion in the first, $4.2 billion in the fourth quarter last year. Sales may reach $75 billion during these last three months, compared with $74.2 billion in the second quarter, $71.9 billion in the first and $73.6 billion in the last three months of 1955. Profits after taxes per dollar of sales should hover around 5.5 cents, the figure that has been prevalent for about a year.

Exception: Farm Equipment

Despite generally good prospects, not all segments of the economy share in the prosperity. Heavy inventories of unsold tractors and farm implements continue to plague the farm equipment industry, despite production cutbacks this year. Factory sales of farm machinery may range from $1 billion to $1.4 billion this year, 15 to 25 per cent below 1955's total and 5 to 10 per cent below 1954's. The most optimistic estimate for 1957 prospects puts that year's sales at $1.6 billion, but most predictions are much closer to $1 billion.

Exception: Housing Starts

And homebuilders keep singing their song of woe. They told government housing and monetary officials in Washington last week that, if present fiscal policies continue, 1957 will see only 800,000 or 900,000 starts. You have to go back to the 1940s to find a year under the 1-million mark. Starts this year will total about 1.1 million, compared with more than 1.3 million in 1955. Not everyone is so glum about 1957. U.S. officials (see page 68) predict another 1.1-million year.

Aluminum Output Climbs

U.S. primary aluminum production will reach 1,675,000 tons in 1956, predicts Lawrence Litchfield Jr., Aluminum Co. of America's vice president. Last year's total: 1,565,721 tons. He adds: "Shipments of aluminum

Technical Outlook—p. 93 Market Outlook—p. 133

during 1956 are expected to be about 5 per cent above last year's record high of 2 million tons."

Debut for Jasper

First shipment of iron concentrates from Michigan jasper left Marquette, Mich., last Wednesday for International Harvester Co.'s Wisconsin Steel Division, South Chicago, Ill. The consignment, 4500 tons of marble-size pellets, was from Marquette Iron Mining Co.'s new pelletizing plant at Eagle Mills, Mich. The pellets, containing 63.5 per cent iron, were processed from jasper (hard rock with 40 per cent iron) from an open pit at Republic, Mich. The jasper setup involves participation of four steel firms (including Wisconsin Steel) and Cleveland-Cliffs Iron Co., Cleveland, the project operator.

Report on Scrap

Commerce Secretary Sinclair Weeks came through with a preliminary report on the U.S. iron and steel scrap picture: Exports are being maintained at a higher annual rate than they were in 1955; prices are at an all-time high; domestic demand is at a record level. No indication was given of an answer to the question: Can the U.S. continue to export and use scrap at present rates and still have enough left to support possible wartime needs? Research by the Census Bureau and Battelle Memorial Institute may throw light on the matter. The study is due Jan. 31 but will probably be late.

Productivity in Steel

Is productivity improving enough? The Department of Labor's Bureau of Labor Statistics says output per man-hour in basic steel increased at an average annual rate of 2.9 per cent from 1947 through 1955. Some experts believe productivity must increase at an average annual rate of 3.5 per cent over the next 20 years if we are to continue to improve our standard of living at the same pace of the last two decades.

Memo on Prices

Here are samples of the latest price hikes: Continental Can Co. will boost containers made of tin mill products 10 cents per base box, plus 3 per cent; General Electric Co.'s Industrial Heating Department has raised quotations 5 to 10 per cent on the products it makes; Electro Refractories & Abrasives Corp. increased prices about 8 per cent on Tercod crucibles and refractories of similar composition.

Straws in the Wind

Hydraulic turbine manufacturers want federal contracts limited to American producers, to help offset the pricing competition from foreign makers . . . American Can Co. and Continental Can have signed three-year agreements with the United Steelworkers similar to the settlements with the basic steel industry . . . An age-old dream, free trade in Europe, may move a step nearer reality Oct. 10 when ministers from West Germany, France, Belgium, Netherlands, Luxemburg and Italy meet to try to draft a customs union treaty.

OUTLOOK MET
METALWORKI

what's going on at MARVEL?

1. A NEW BUILDING PROGRAM...

Not long after you read this, we will have completed the MARVEL plant expansion program which will *double* our already considerable manufacturing space. MARVEL'S confidence in the future and its continuing development, coupled with the increasing demand for MARVEL Hack Saws, Band Saws and Hack Saw Blades, makes this expansion mandatory.

2. A NEW "SUPER" BAND SAW

In our enlarged plant, we will demonstrate for the first time, a completely new, heavy duty, all-hydraulic, fully universal MARVEL Band Saw designed especially for High Speed Steel Band Saw Blades. This new "Super" Band Saw is heavier, more powerful and rugged than any band saw yet available. It incorporates a great many new and exclusive design and operating features to make it the most advanced Band Saw for BOTH high production and universal work.

3. AN INVITATION TO "TRY" BEFORE YOU BUY

One or more of the new Band Saws will be set up in our new plant, together with new, improved MARVEL Hack Saws, to demonstrate comparative performance on a wide variety of work. We will also set up specific cutting-off jobs requested by customers or prospective purchasers on *both* types of machines and arrange to have interested personnel observe and check the demonstration of comparative saw performance *on their own work.*

What better way is there to prove to yourself the speed, accuracy, efficiency and economy of MARVEL Saws and to select the right type of saw (hack saw or band saw) to best fit your individual job requirements?

ARMSTRONG–BLUM MFG. CO.
5700 Bloomingdale Avenue • Chicago 39, Illinois

G—1600

MARVEL Metal Cutting SAWS
Better Machines–Better Blades

Smashing scrap since 1953 . . . this 48" diameter, 16,770-lb. Ni-Hard drop ball is still going strong. Pays maximum return per dollar invested. High hardness helps lengthen its life. In addition, it is tougher than this hardness indicates. That's why it withstands the shock of jolts against scrap. Produced by United Engineering & Foundry Co., Pittsburgh, Pa.

Ni-Hard ball outlasts others by 3 to 1 ...breaks 27,000 tons of scrap and still on job

A Ni-Hard* drop ball earns you money because its resistance to abrasion greatly increases its life. Look at this one, for example . . . on an open hearth scrap drop at United States Steel Corporation's Youngstown District Works.

The ball looks battered, with one side slightly flattened out . . . but it should be after the service it has already given:

This Ni-Hard ball has broken up some 25 tons of scrap a day, seven days a week for more than three years.

Balls made of other materials averaged only 13½ months in the same service. Yet after 40 months the Ni-Hard ball is still in use. As a result of its unmatched resistance to abrasion, it still retains its working weight.

You'll profit by using a ball that stays hefty longer as it breaks up your scrap. So specify your next drop ball in Ni-Hard nickel-chromium white iron. A list of authorized producers is yours for the asking. Write for it now.

*Registered Trademark

Ni-Hard drop balls come in various sizes, and applications include fragmentation in reclaiming steel scrap from slag, breaking up cast iron scrap, powdering rock and the like. These drop balls were cast by United Engineering & Foundry Company.

INCO THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street New York 5, N.Y.

Chart Your Growth

"If we could first know where we are and whither we are tending, we could better judge what to do and how to do it."

Acting on that 100-year-old advice by Abraham Lincoln, the Steel Founders' Society of America is making (page 64) a comprehensive study of the end-use markets for steel castings and a projection of what those markets are likely to be for the next 20 years.

The society already has collected data from steel founders on the end uses to which their products were put from 1950 through 1954. Coverage is nearly 80 per cent of steel castings shipped during the five-year period.

A second phase of the study will be to project by end uses the probable sale of steel castings by five-year periods through 1975. The society's staff will work with industries using steel castings to determine growth factors in those industries and trends in the uses of steel castings.

Preliminary estimates indicate shipments of steel castings will rise to 3.2 million tons by 1975, more than twice the tonnage shipped in 1955.

We can see many advantages to this type of co-operative market research by an industry. It causes steel founders to raise their sights on the total market and enables them to prepare for the growth ahead. It encourages them to plan their expansion before the market becomes an actuality.

By studying in detail the uses of steel castings by end use classifications, founders become more intimately acquainted with their own markets and with the trends and changes in them. The better information on what is happening among their customers can be a tremendous he'p in holding and increasing their share of the market. Armed with more knowledge, the founders will be in position to better serve their customers.

We need more industry-wide market research on capital goods. The power industry—from utilities to equipment manufacturers—has demonstrated how facilities can be matched to our increasing needs through such research. It can help level out the ups and downs of demand and alleviate the alternating shortages and surpluses. It can help management make decisions which are based more on facts and less on intuition.

Above all, it can show us, as an industry, where we are heading.

We believe that major studies like the Paley Report of 1952 and the Twentieth Century Fund's 1955 survey of America's needs and resources are having a profound effect on our current growth and prosperity by bringing to light the potentials of our economy.

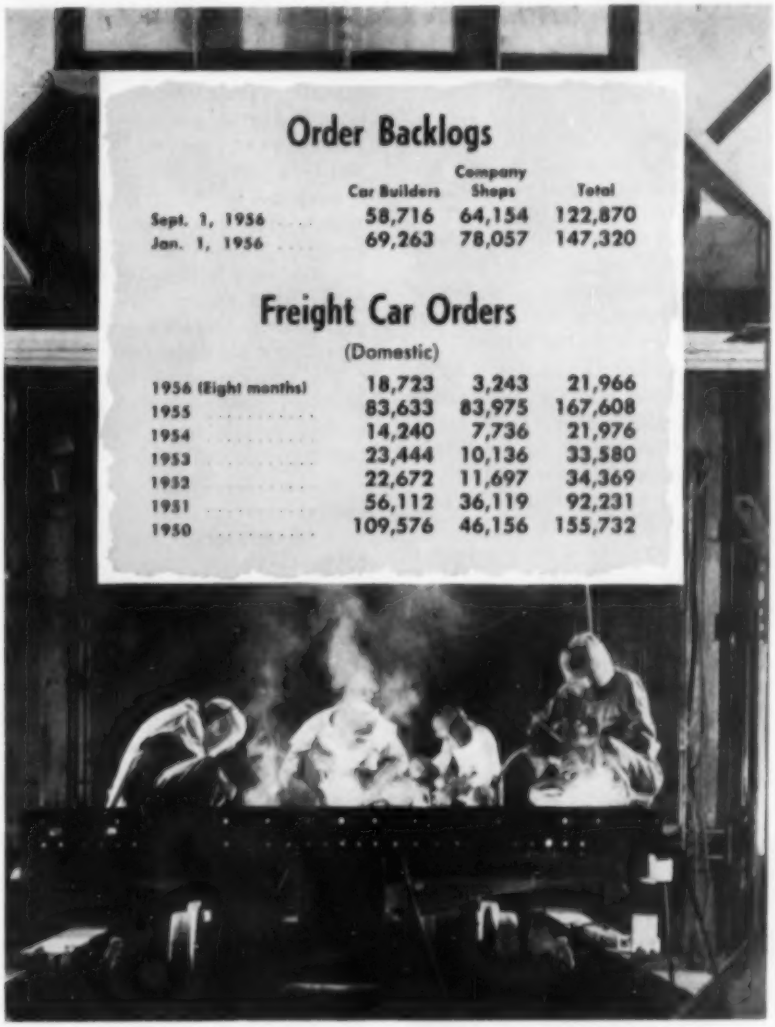
Walter J Campbell

EDITOR

WHEN THE BACK NEEDED A BREAK

Time was, and not too long ago, when industry used to spend almost as much time moving products as in making them. Then right before our eyes a whole new industry evolved, dedicated to the efficient, mechanized handling of materials. Today, the wizardry of materials handling people has not only sliced substantial cost items from industry's expense sheets, but has won the eternal gratitude of working men everywhere. Better steels have contributed to the developments in materials handling. And at Inland, we've been giving progress a push by providing the *right* steels to this important industry.

INLAND STEEL COMPANY *38 South Dearborn Street, Chicago 3, Illinois. Sales Offices: Chicago, Milwaukee, St. Paul, Davenport, St. Louis, Kansas City, Detroit, Indianapolis, New York. Steel products supplied to the materials handling industry include sheets and strip, Ti-Co galvanized sheets, bars, plates, structurals, 4-Way safety plate. Other products: tin mill products, reinforcing bars, rails and track accessories, coal chemicals.*



Order Backlogs

	Car Builders	Company Shops	Total
Sept. 1, 1956	58,716	64,154	122,870
Jan. 1, 1956	69,263	78,057	147,320

Freight Car Orders

(Domestic)

1956 (Eight months)	18,723	3,243	21,966
1955	83,633	83,975	167,608
1954	14,240	7,736	21,976
1953	23,444	10,136	33,580
1952	22,672	11,697	34,369
1951	56,112	36,119	92,231
1950	109,576	46,156	155,732

Figures: American Railway Car Inst., Assn. of American Railroads. Photo: ACF Industries Inc.

Car Building Bogs Down

Despite big order backlogs, freight car makers can't push shipments up because of steel shortages. It could be September, '58, before current orders are completed

BASED on freight car order backlogs, it's a good bet that structurals and plates will stay in tight supply for all users over the next two years.

Reason: Freight car builders take large quantities of these products. Their order backlog, now pegged close to 123,000 cars, represents nearly 20 per cent of all plate and structural tonnage produced in 1955.

Outlook—Car building capacity hasn't changed materially since 1949, when average monthly shipments exceeded 9000 units. But builders don't think they'll be able to push shipments above 5000 a month until early 1957. They add that they don't think enough steel will be available in the foreseeable future to permit them to ship more than 6000 cars a month.

But they'll be pushing the mills for steel as hard as they can. Right now, the railroads are operating under the handicap of an average daily shortage of at least 6000 box and hopper-type freight cars. Scarcities of other types, notably mill gondola, are also starting to show up.

Effects—Prospects are that the squeeze on steel supplies will be tightest during the next few months. Car builders have the dual problem of building their shipments up and replacing shop inventories. Through August, they averaged better than 5000 car deliveries monthly. But August's 5364 cars were built largely from stocks. Because mills were on strike, inventories were wiped out.

Builders say that for every day lost by the steel mills, they'll lose one and one-half days' production. Several measures are being taken to minimize losses. Shipping schedules are being revised in favor of the lowest inventory products. Some orders placed with captive builders are being turned over to the independents so repair work on rolling stock can be speeded up.

What's Short—The popular idea that the plate shortage is the main reason for the lag in car building isn't entirely true. Builders say that structural steel, particularly special car shapes, is the main culprit. Wheels and axles also are tight. Wheel deliveries are extended into the second quarter of 1957.

Builders also point out that the plate situation is less critical than it was because many sheet-strip mills are starting to convert to light plate.

Increases — Changes in design and loading-handling requirements are increasing the use of plates and structurals in all types of cars, particularly box, hopper, gondola and tank units. A plain boxcar takes some 3 tons of plate and 6 tons of shapes—2 tons more overall than was needed five years ago. Hoppers take an average of 11

tons of plate and 6 of structurals, again up over 2 tons. Tank cars average about 16 tons of plate, though some run as heavy as 24 and 30 tons.

Plate thicknesses have also gone up. For most gondolas, sides and ends are made from ⅛-in. plate, compared with the old standard of 1/16-in. This alone increases requirements about 2 tons in each car.

Help Coming?—Addition to our plate and structural capacity seems to be the only answer to shortages. It's possible Washington will speed action by reopening expansion goals for these product classes in the near future (STEEL, Oct. 1, p. 113).

But there's no easy answer to immediate shortages. In addition to the push from the car builders, capacity will also be taxed by the heavy construction industry, expected to set new records next year. Probably not until one or the other of these big markets eases its demand will plate and structurals be in good supply again.

Fabricator Builds

Armco enlarges dip galvanizing facility in Middletown, O., and erects new plant in Atlanta

ARMCO Steel Corp. has started construction on a half million dollar fabricating plant at Atlanta which will have 60,000 sq ft of production space. It'll be operated by a subsidiary, Armco Drainage & Metal Products Inc., maker of steel products for the agriculture and construction industries.

The firm also is building a $300,000 addition to its fabricating plant at Middletown, O. The 175-ft extension to the dip galvanizing building will have 15,750 sq ft of floor space. It will be used primarily for loading dipped galvanized products from the formed products department.

Products—S. R. Ives, president of Armco Drainage, says the Atlanta plant will produce gasoline and fuel oil bulk storage tanks, corrugated metal pipe and pipe arch in a wide range of sizes, farm pond drainage pipe and miscellaneous construction products.

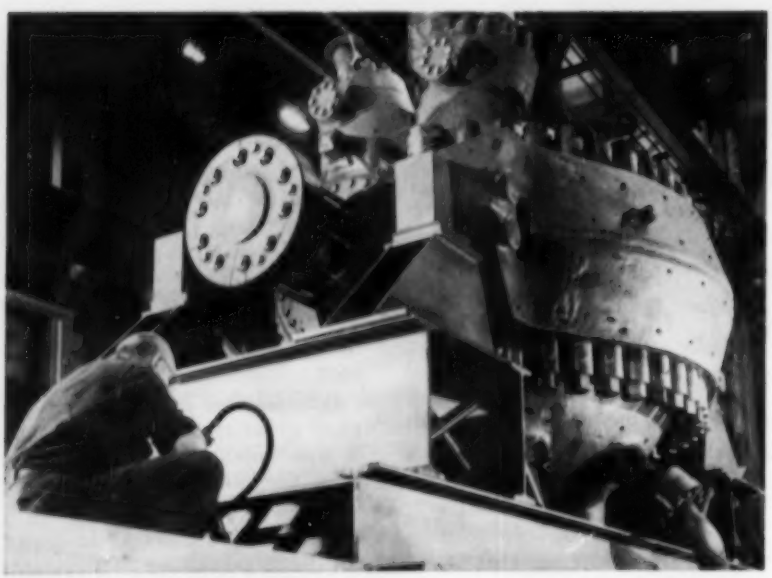
The plant will have facilities to convert corrugated metal pipe to sewer pipe and to coat pipe with asphalt. Facilities for manufacturing Armco prefabricated steel buildings are expected to be added, Mr. Ives says.

Proposed — R. L. Gray, Armco Steel's president, states the company has asked the government for fast tax write-offs on a proposed $118-million expansion program at the Houston works of the company's Sheffield Division.

The program would boost output of heavy steel plate and structural shapes and provide facilities for making seamless tubing.

Plans call for the addition of a second blast furnace, a second battery of coke ovens, additional sintering facilities, three 300-ton open hearths, a slabbing and blooming mill, a mill for rolling tube rounds and alloy bars, additions to step up production of the heavy plate mill, a seamless tube mill and heat treating facilities.

Fast amortization was also requested for a $5-million project to open a new coal mine near McAlester, Okla., which has adequate reserves of coking coal for the Houston plant.



More Power for America

This is the steam turbine casing which encloses the supercritical pressure section of the first commercial supercritical pressure steam turbine-generator unit. It's for Ohio Power Co.'s Philo power station on the American Gas & Electric Service System near Zanesville, O. The turbine will use steam at the initial pressure of 4500 psi and at the initial temperature of 1150°F. The highest known steam pressure used by steam turbines now in commercial service is 2400 psi. General Electric Co. is manufacturing the unit

New Steel Producer

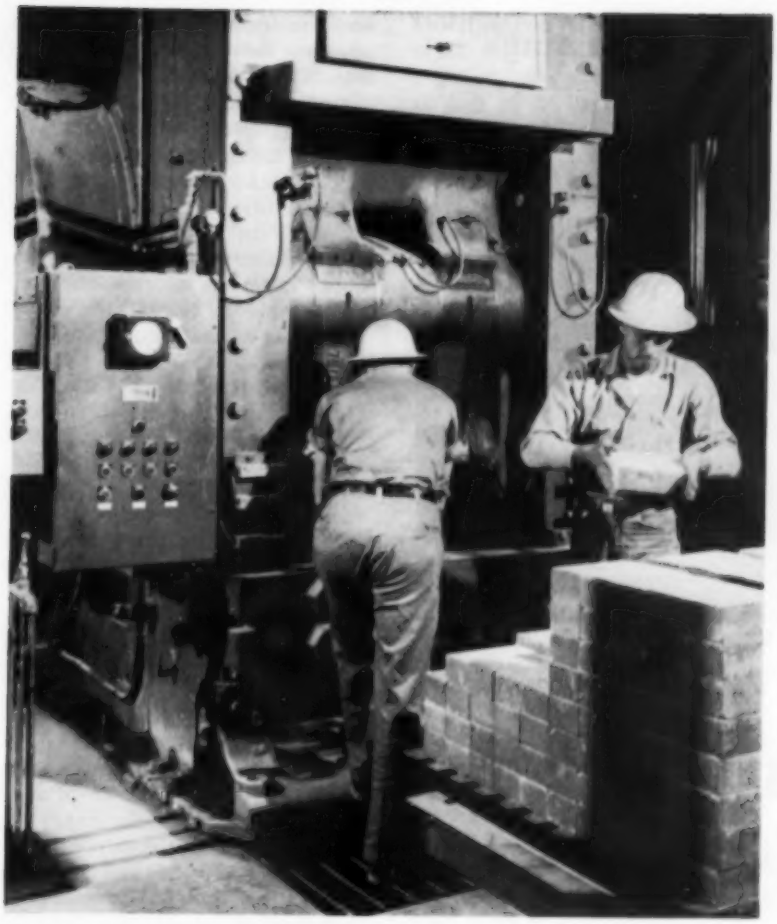
By the end of next year, a new steel producer will be in operation in Mississippi. Mississippi Steel Corp. will build a 30,000-ton a year electric furnace at Flowood, near Jackson.

Walter Stewart, former vice president of Virginia Steel Co., Birmingham, and an official of Truscon Steel Division, Republic Steel Corp., Youngstown, is president. Scrap will be purchased from Mississippi dealers, many of whom are stockholders.

Mesta Makes Pickling Line

Mesta Machine Co., Pittsburgh, will design and make a 48-in. continuous pickling line for the Sparrows Point, Md., plant of Bethlehem Steel Co.

The line will pickle coils of hot-rolled mild carbon steel up to 44 in. wide.



Calcined magnesia is sent from California to Ohio as . . .

Kaiser Makes Basic Brick

DELIVERIES of basic brick to the steel industry will hit 600,000 tons this year, estimates Frank M. Cashin, vice president of Kaiser Aluminum & Chemical Corp. Aimed at the rapidly growing demand is a basic refractory plant just opened by Kaiser Chemicals Division at Columbiana, O., near Youngstown.

Kaiser says it has been supplying about 10 per cent of the basic brick market. With the new plant, which is an overnight freight trip from the center of steel production, the company has raised its sights to 25 per cent.

It is the first basic brick plant in the Great Lakes area to get into production. Both General Refractories Co. and Harbison-Walker Refractories Co. are planning plants in the Chicago area, and General has another under construction at Hamilton, Ont. Most of the production has been concentrated on the East and West coasts.

Long Haul—Kaiser's raw materials are chrome ore from the Philippines and periclase (high-purity calcined magnesia) from Kaiser Chemicals' sea water magnesia plant at Moss Landing, Calif. They come in by rail from Baltimore, but the company plans to ship directly to Lake Erie ports when the St. Lawrence Seaway opens, cutting the rail haul to about 70 miles.

Plant officials do not discount the presence of large supplies of dolomite (for periclase) nearby, nor the huge chemical complex growing up a few miles to the north, but they say they have no immediate plans for tying in with either. They find steel plants in the immediate area reason enough for optimism.

Open Hearth — The plant will also prepare and bag basic ramming mixes, widely used for monolithic open hearth bottoms. Target: 60 per cent of the business. It also expects to ship about 30,000 tons of bagged basic repair mixes yearly, or about 30 per cent of the industry total.

Most of the 800-odd basic open hearths in the country have silica brick roofs, a prime target for basic brick. Current practice, particularly the use of oxygen in the open hearth, is especially tough on acid roofs. Basic brickmakers are pinning high hopes on the seven basic furnace roofs operating or being installed. The zebra roof, a combination of acid and basic brick, represents another basic market.

Ready — The Columbiana plant has facilities for stockpiling a year's supply of chrome ore, crushing and proportioning equipment more than adequate for present demand and plenty of room for expansion. The two brick presses and the kiln will be bolstered with additional equipment when needed. The plant has a yearly capacity of 48,000 tons of burned and chemically bonded brick.

First brick shipments are expected to be made soon.

New Plant for West Coast

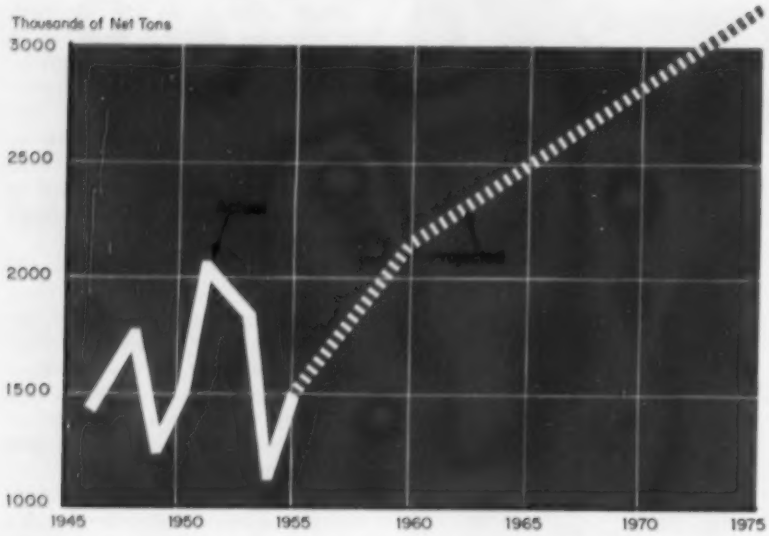
Construction of a plant at Visalia, Calif., is planned by Line Material Co., a division of McGraw Electric Co., Elgin, Ill.

R. G. Wheaton, Line Material president, says construction will start about Nov. 1. Completion is scheduled for May 1, 1957.

The plant, which will produce the company's line of round wound distribution transformers, will have an initial employment of 150.

Total Shipments of Steel Castings

Including Castings for Sale and for Own Use



Actual figures: U. S. Bureau of the Census. Projected figures: Steel Founders' Society of America.

Steel Founders Eye Future

New survey by Steel Founders' Society of America establishes bench marks for projecting potential markets of 54 end uses. Railroad equipment is largest consumer

STEEL FOUNDERS see a pattern for growing markets as far ahead as 1975. No guesswork or intuition is involved; it's the result of a market research program carried out by the Steel Founders' Society of America.

F. Kermit Donaldson, executive vice president of the society, calls it "the most comprehensive study of the end-use markets for steel castings ever made." Covering a five-year period (1950 through 1954), the survey includes 77.8 per cent of all castings for sale. Because the society was interested mainly in where its members could sell their products, it made no particular effort to cover captive shops. About 90 per cent of the survey is accounted for by castings for sale.

First Things First—The society's market research committee set about first to project the markets for all steel castings through 1975. Allen M. Slichter, committee chairman and president of Pelton Steel Casting Co., Milwaukee, says there is a close correlation between the Commerce department's durable goods production index and the index of steel casting production. Using a projection of the Commerce index developed by the Stanford Research Institute, the research committee projected the steel casting index to 1975. Translated into tons, the industry is looking forward to a total market of at least 3.2 million tons 19 years from now (see chart above), or double the 1955 figure of 1,531,000 tons.

To break down this potential market into its component parts is the ultimate goal of the society. Its survey covered 54 individual classifications of steel castings by end use. The tonnages reported for the five-year period will become bench marks for the projection of future markets. "For the first time, we have actual, factual and understandable information covering the markets for steel castings," Mr. Donaldson declares.

Phase II—But that's only the beginning. Mr. Slichter points out: "In our industry we must, by and large, depend on someone else—the manufacturer of a final product—to sell our production." From those manufacturers, the society hopes to get the information which will enable it to use the bench marks for estimating potentials.

A good example is the highway trailer industry. The Truck-Trailer Manufacturers Association has studied its own sales prospects through 1975. Sixty-six respondents to the SFSA survey make castings for truck trailers, establishing a bench mark of about 40,000 tons of castings a year for the base period. (The society will try to base all estimates on five-year averages to iron out peaks and valleys.) By applying this base figure to the trailer industry's survey, the research committee estimates that by 1971-1975, that industry will require an average of a little over 100,000 tons of steel castings a year, or about 170 per cent above present requirements.

Co-operation—In making these projections, the steel founders are counting on co-operation from the industries they serve. "This trailer report is typical of what we hope to find available concerning each of our major customer industries," observes Mr. Slichter. "We are optimistic such will be the case, as most up-to-date, energetic trade associations are engaged in market research."

Mr. Slichter cautions that two basic assumptions must be made in estimating these markets: 1. That the results of the society's survey are relative to actual production by the segment of the market involved during the base period. 2. That the proportion of steel castings in the product will remain constant. "On the basis of what we know about the truck trailer industry, we believe the proportion will increase, so that our projection is in effect a minimum. For others, the proportion may decrease. That is why we have to keep a constant eye on these markets," Mr. Donaldson says.

More To Come—The society is

going to make this a continuing study, with data collected annually. Reasons: 1. The more complete the data, the more accurate the projections. 2. The more up to date the data, the better the ability to compensate for changes in the market structure. 3. By collecting data on an annual basis, the society will be able to check short-term projections and improve its ability to make accurate long-term projections.

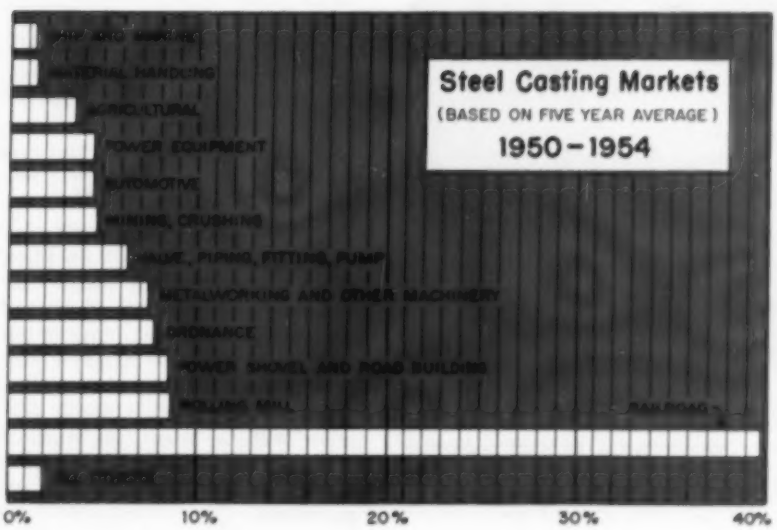
While the main emphasis is on future markets, the survey came up with some interesting—and in some cases surprising—facts about where the industry has been. The chart below shows the 13 general categories into which the 54 individual classifications were grouped. For instance, railroad, the biggest customer, includes specialties, locomotive and all other railroad castings. In the full, 110-page report, only 1.91 per cent of the total market is grouped in the miscellaneous category, compared with 15.5 per cent in the latest Bureau of the Census report. The biggest individual market is railroad specialties (28.52 per cent of shipments), while the smallest is refrigeration machinery (0.02 per cent). The ten largest classifications account for 68.98 per cent of total sales. The society plans to start with these ten in its projections.

Top to Bottom—"Rather to our surprise," says Mr. Donaldson, "more foundries reported making steel castings for ordnance (not including cast armor) than for any other individual category. At the bottom of the list is elevator castings—only three foundries produce these." Charts have been prepared for all 54 classifications, showing shipments by tons as well as the percentage of the total market. They'll be in the full report.

A geographical breakdown shows that over the five-year period, Pennsylvania topped all other states in sales—20.35 per cent of the total. Illinois ranks second (18.97 per cent); Ohio, third (15.81 per cent); New York, fourth (8.08 per cent). Twenty-eight states and Canada are included. Of the 142 foundries reporting, 98 are members of the society. Better than 94 per cent of the tonnage is carbon and low alloy castings. For the five-year period, annual shipments averaged 1,053,450 tons, with a high of 1,298,676 tons in 1951 and a low of 735,011 tons in 1954.

Forward Look—"If we can gain some reasonably accurate idea as to what the next ten years or more are likely to mean in terms of demand for our products," Mr. Slichter declares, "we will all have a far better chance of doing the right thing at the right time." (For comments on this program, see editorial, page 59.)

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.*



New Plant for GM

Construction starts next summer on Euclid division facility. Product: Crawler tractors

GENERAL MOTORS Corp. will build a 582,000-sq-ft plant for its Euclid division at Hudson, O., 35 miles southeast of Cleveland.

It will be on a 440-acre site at the intersection of the Ohio Turnpike and the proposed north-south thruway.

Dual Expansion—R. Q. Armington, Euclid's general manager, says about 1500 persons will be employed. Manufacture of TC-12 crawler tractors, now centralized in Euclid's Clinton Road plant in Cleveland, will be transferred to Hudson.

Mr. Armington says the transfer "will enable us to manufacture this powerful and maneuverable crawler tractor under one roof and will provide us with the much-needed additional facility for making scrapers at the Clinton Road plant."

While some workers will be transferred to the new operation, Euclid's employment of 3200 in the Cleveland area will not be affected.

Du Pont Builds in Virginia

A multimillion dollar plant will be built in Richmond, Va., by E. I. du Pont de Nemours & Co. Inc. It'll produce nylon yarn used in tire cord and other industrial products.

Construction is expected to begin late this year and initial operations are planned for the latter part of 1957. Plant capacity will be 40-million lb of yarn a year.

Another Furnace for Armco

Loftus Engineering Corp., Pittsburgh, says it will design, engineer and supervise the erection of another 275-ton open hearth furnace for Armco Steel Corp.'s Middletown, O., works.

Yale & Towne Expands in South

Material handling equipment will be made in a 120,000-sq-ft factory Yale & Towne Mfg. Co., plans to build at Forrest City, Ark.

IH Keeps Pace on Automation

The firm holds a two-day conference to keep key manufacturing and engineering personnel up to date on its own and other developments in automation

KEEPING PACE with automation's rapid developments in any one field is tough. But management of a sprawling, multiactivity company has an even bigger problem. For it, masterminding the most effective application of all developments on a company-wide basis takes on staggering proportions.

Correlating — To make sure its left hands know what its right hands are doing in automation, International Harvester Co. designed its own approach. By the end of this week some 280 key manufacturing and engineering personnel will have completed a two-day conference on "Progress Through Automation."

Its goals are:

1. To exchange information between technical and managerial people of all divisions.

2. To insure that these men are fully acquainted with management level thinking about automation.

3. To provide a review of recent advances in manufacturing facilities, particularly in the area of automation.

4. To provide thought-provoking sessions to stimulate new ideas and interest on the part of each participant.

Spreading Gospel—Top people from Harvester and outside companies reviewed the basic principles of automation and talked about the latest developments. Also discussed were the problems a company faces in utilizing these developments to best advantage. Talks were balanced with demonstrations by 20 machine tool and electronic companies which set up their latest equipment in Harvester's research center.

Emphasized by R. C. Archer, vice president-manufacturing, in his keynote talk: The degree that automation is applied depends upon production requirements and design stability—partial automation may provide the greatest potential benefits in some cases; in others, complete automation of a group of machines or an entire line may be justified. Stressed, too, was the necessity of close liaison between manufacturing and engineering in designing products and installing facilities for maximum effectiveness of automation.

IH Developments—In addition to exhibits by the outside companies, Harvester displayed some of its recent developments in material handling, welding and foundry techniques. "We emphasized these areas for two reasons," explains W. D. Bryson, manager of manufacturing research. "They generally present many personnel problems; automation in them tends to eliminate the menial, less desirable jobs."

One of the biggest plus values of the sessions, according to participants, was the opportunity to see the latest developments in action. Many had heard or read about most activities demonstrated; seeing them in action had additional impact.

Automation at Harvester is no new program, officials emphasize. It has been a continuing process. The aim of the conference was to add new zest to the company's program of "planning for profits by reducing our manufacturing costs."

Among those attending Harvester's automation conference (left to right): Wesley Fisher, DoAll Co. factory engineer; Harvester officials: E. F. Schneider, vice president; C. N. McIntire, manager of manufacturing of farm implement division; H. W. Bercher, executive vice president; P. V. Moulder, president; R. L. Witsche, assistant general supervisor of manufacturing research; R. C. Archer, vice president of manufacturing

Drillmaker Doubles Size

New York Twist Drill Co. Inc., New York, is building a new plant next to its present one which will double its manufacturing capacity. Automated drillmaking equipment will be installed.

New England Firm Grows

Whitin Machine Works, Whitinsville, Mass., will enlarge its plant by 94,000 sq ft. The textile machinery maker recently diversified by adding an office duplicating machine to its line. A major portion of the company's $4-million expansion and modernization program will be spent on machine tools and other equipment needed to set up new manufacturing departments.

Europe Aids the Worker

Progress is being made in the European Community's moves to solve the problem of technological unemployment in coal and steel. Workers get help in finding new jobs

TECHNOLOGICAL unemployment is being attacked constructively in France and Italy.

Readaptation (all that is needed to insure smooth passage of a worker from one job to another) is the magic word.

A plan under that name is being pushed by the European Community for Coal & Steel. Its chief motive is to remove the fear of unemployment which has caused workers to cling to obsolete methods of production.

Why—When the European Community was formed, it was recognized that opening the common market would lead to modernization and mechanization. Readaptation was designed to keep the brunt of the ensuing technological change from falling on the worker. Measures were designed to forestall crises rather than to alleviate them after they came into being.

Workers do not contribute to the plan. The High Authority and the governments concerned provide benefits while the worker is out of a job. There are special provisions for retraining workers, and labor mobility is encouraged.

In Italy—Near Milan is a small steelworks, the Darfo. While it has five blast furnaces in operation, the development of a common steel market hastened the closing of an uneconomic rolling mill section. Since July, 1955, 360 men have lost their jobs.

A new tube mill is under construction 5 miles from Darfo. The workers, laid off at Darfo, have been hired to build it. The difference between present wages and their former pay is being paid by the European Community. When the building is finished, the workers will be trained for jobs in the new mill.

In France—Before the common market in steel was established in 1953, there were backward areas in the French steel industry which had survived through tariffs, quotas and discriminatory rates for non-French steel.

The Saint Etienne area in central France is an example. Four of its companies merged to meet the new competition in the common market and asked the French government and European Community for aid in a reconversion plan that would lead to higher productivity and lower costs. Over 12,000 workers were affected.

The company was granted $840,000 to pay for retraining workers, their moving costs and wages.

More Power for Austria

The World Bank has loaned Austria $31 million for an electric power expansion program.

A $21-million loan was made for the Ybbs-Persenbeug project, a hydroelectric plant being constructed about 80 miles up the Danube from Vienna. Six generating units installed in two power houses will furnish 192,000 kw. The project was started in 1953; three generators are expected to be in operation early in 1958, the others by the end of 1959.

The second loan, for $10 million, will be used for the expansion of two thermal power plants in southwestern Austria. At Voitsberg, a 65,000-kw unit will be added and capacity will be increased at St. Andrae by 100,000 kw. Brown coal will be used for fuel.

World Trade Notes

• Thailand's state railway has awarded National Malleable & Steel Castings Co., Cleveland, a contract worth more than $2.6 million for railway equipment, including automatic couplers, rubber cushioned draft gears and accessory castings. All of Thailand's rolling stock will be converted to center coupling and buffing (shock control). The program is supported by a loan from the World Bank.

• Aircraft construction in France during the second quarter was at a rate more than double the 1955 average. Domestic and foreign orders boosted the production index to 118 in the first quarter (1938 = 100) and 141 in the second quarter.

• A slackening in home markets means British steelmakers will be able to accept more overseas business. Expansion has already taken place in exports of tubes and pipes.

Japanese Import 125,000-Kw Steam Turbine-Generator

General Electric Co.'s Large Steam Turbine-Generator Department made this huge power maker which will provide electricity for nearly 925,000 Japanese. The unit is shown being pulled into the Toyosu steam station of the Tokyo Electric Power Co. In 1958, GE will send a 175,000-kw machine to Japan

New Construction Records Set for 1957, Says BDSA

HOW FAR can the construction boom go? Walter W. Schneider, BDSA construction statistics chief, thinks new construction could hit $48 billion next year. He sees rock bottom expenditures at $46.5 billion. The higher figure can be reached if: 1. The money supply for private housing will loosen somewhat. 2. Money will continue to be available for public construction. 3. Industrial, commercial and public utility construction will hold to present trend lines. 4. The federal highway program gets well into gear in the next six months.

Housing Demand Is Established

This year may have established a demand floor for new housing. During the first seven months, the rate of housing starts has varied only once by more than 30,000 from an annual total of 1.1 million. Because savings are up this year, Mr. Schneider sees more mortgage money available next year. Military and public housing should insure a 1.1-million to 1.2-million year in 1957.

Tool Plan for Fiscal 1959?

The Defense department's new replacement program for in-use machine tools (STEEL, Oct. 1, p. 120) will be pretty much of a dud for the next year at least, maybe longer. The fiscal 1958 budgets are nearly drawn up, so hope for more than just a starter in that year seems unlikely. Time isn't the only factor. Defense department officials say the Air Force is the only service with a concrete tool replacement program ready to roll. It's likely to be at least fiscal 1959 before the program can be evaluated.

Replacement Program: No Bonanza

The Vance Report in early 1953 put a value of close to $6 billion on government machines. The DOD inventory now is probably less than two-thirds of that, which would place the value of the replacement program at not more than $200 million, perhaps as low as $80 million. Its size will be even lower than those "perhaps" figures because this particular replacement program is only for in-use equipment. Stand-by lines and package plants aren't included and will have to fend for themselves as in the past. Estimates put total DOD tool buying at $100 million in fiscal 1954 and 1955. It probably wasn't much, if any, more than that last year and won't be larger this year or next.

Expansion in Aircraft

Look for an expanding market in the aircraft industry. Commerce Secretary Sinclair Weeks says American investment in plant equipment, aircraft, research and development, real estate, etc., in that industry was $100 billion-plus through 1955, will "conservatively" be at $150 billion by 1960.

Invitation for Atomics

"No one need await an invitation from the AEC to get into this (atomic) business," states Charles G. Manly, chief, Commercial Development Branch, AEC. How do you find out what is needed? Mr. Manly recommends going to see the companies actively engaged in building or manufacturing reactors, components and fuel elements and those purchasing or operating reactors. Or, he says, you can go directly to the AEC and it will "point out opportunities."

Meet Horace B. McCoy: He's the new administrator of the Business & Defense Services Administration, succeeding Charles F. Honeywell, who resigns Oct. 15. A 36-year veteran of government service, Mr. McCoy has been with the Commerce department for 28 of those years. He was acting administrator of the National Production Authority until it was abolished and its functions and personnel transferred to the BDSA.

moving metal... BLUE ANGELS' style

U. S. NAVY PHOTO

With maximum separation of five feet between each plane, the "Blue Angels" demonstrate precision tactical techniques of naval aviation at speeds of 500 mph and better. This famous team of Navy pilots has thrilled millions of aviation enthusiasts with its "minimum altitude" performances of close order precision flying.

To a constantly increasing number of manufacturers, particularly aircraft and jet engine builders, moving metal by The Cincinnati Milling Machine Company's *Hydroforming* and *Hydrospinning* processes is equally dramatic. Formerly difficult-to-make aircraft, engine, missile and other components are being produced in rapid development time . . . with savings of 50% and more in tooling, materials and labor. These part shapes range from simple to highly complex, formed from a wide range of metals. For detailed information on Hydroforming and Hydrospinning, call in a Process Machinery Division field engineer.

CINCINNATI® 19" HYDROFORM®

JET ENGINE PART of 22 gage Inconel, Hydroformed in two operations. A punch, contoured to the part shape, and a simple draw ring, were the only tools required. Hydroform machines are built in 8", 12", 19", 23", 26" and 32" sizes.

CINCINNATI 42" x 50" HYDROSPIN

NOZZLE, Hydrospun from a wrapped and welded tube (shown at right) of AISI 4130 steel in four passes. Hydrospun parts, having undergone a severe shear deformation, possess increased strength, hardness and resistance to fatigue.

CINCINNATI

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PROCESS MACHINERY DIVISION

THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO, U. S. A.

FORGEABILITY
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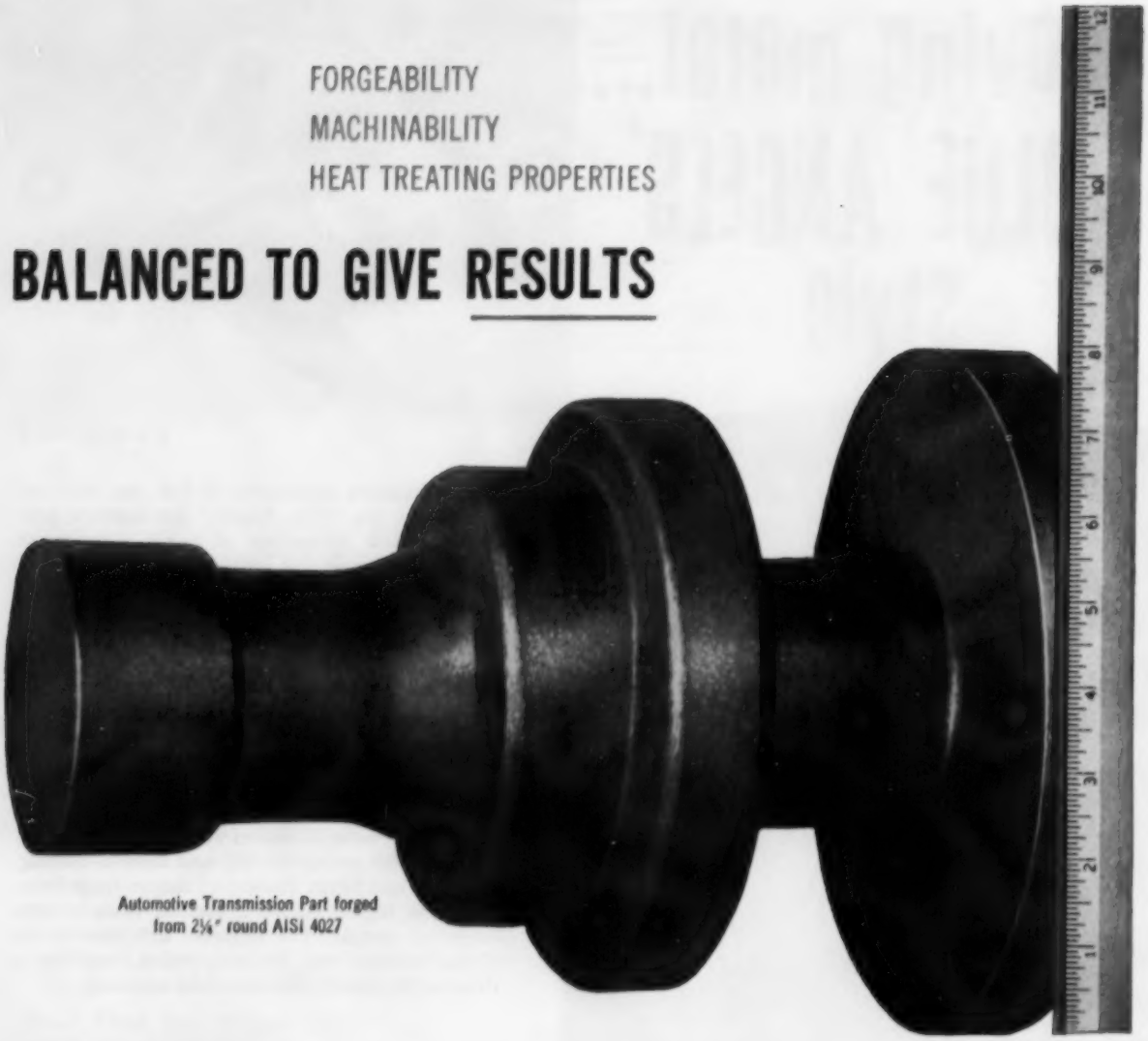

Automotive Transmission Part forged
from 2¼" round AISI 4027

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Forging Quality Steel Bars

For high-quality forgings at low production costs you need forging steels with the right balance of machinability, forgeability and heat treating properties in carbon and alloy grades.

At Jones & Laughlin, strict metallurgical control of every process from ore mine to finishing mill assures the correct balance of these essentials for high-quality forgings.

J&L's staff of experienced metallurgists is available to analyze your particular requirements.

J&L FORGING STEELS—EXACTLY TO SPECIFICATION

Jones & Laughlin
STEEL CORPORATION · PITTSBURGH

Dr. Larson Cuts Red Tape

"SIMPLIFIED administrative procedures help us keep a creative atmosphere at our research center," says Dr. Clarence E. Larson, vice president-research, National Carbon Co., a division of Union Carbide & Carbon Corp.

Approach—He gives the scheduling of machine shop time as an example: "Knowing exactly when specially built equipment will be available eliminates confusing delays in laboratory work, allows more time for creative thinking."

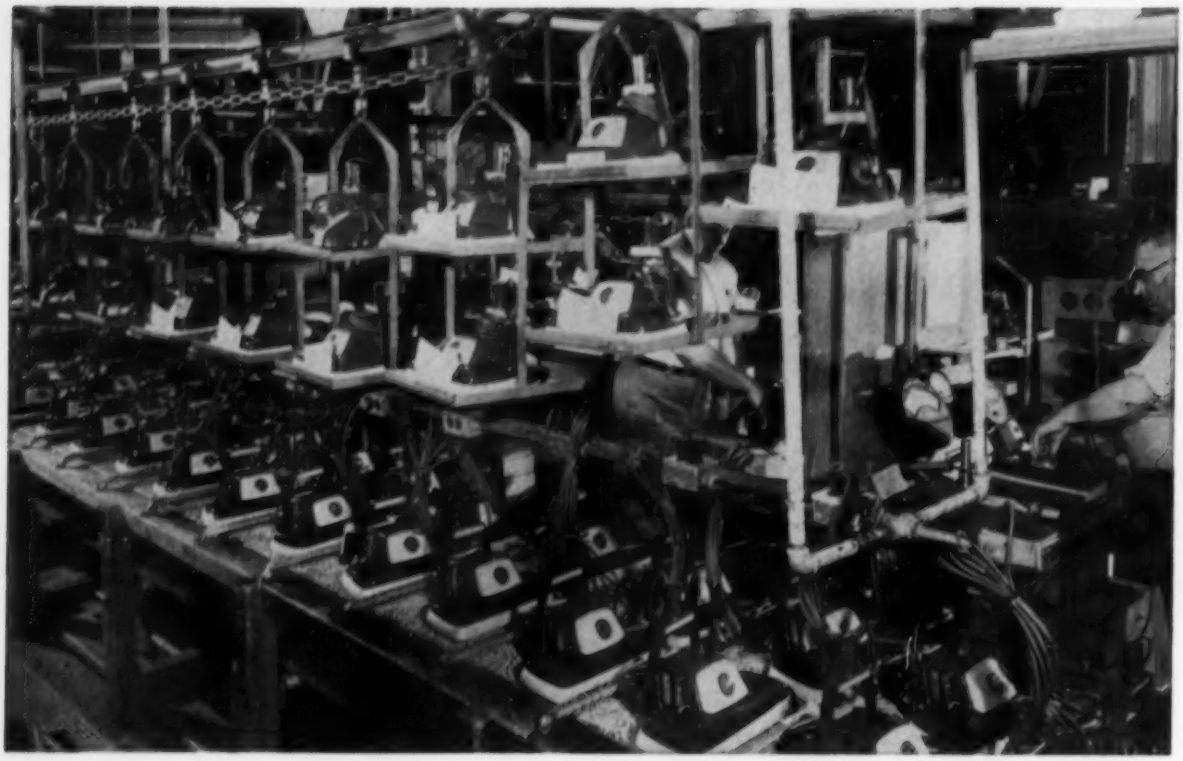
The former director of the Oak Ridge National Laboratory points out that an efficient purchasing staff is part of an orderly administrative program. Day-by-day items are bought far in advance. No paper work is needed to get small items. "Filling out requisitions for inexpensive components (such as a resistor valued at 7 cents) could take $2 worth of a specialist's time."

Reports—Dr. Larson favors progress reports which are a compromise. It is important to have them because they keep management advised and force the individual or team to sit down and analyze what has been done and what remains to be tackled. But detailed write-ups are not requested.

A Trend?—Dr. Larson emphasizes: "While we still have individual assignments, the team concept is growing. We are finding that it is important for our scientific personnel to talk with other people—members of the team or with outside university groups working on similar problems. We encourage our people to attend technical meetings as well as graduate college courses of particular interest to their field." The team approach builds enthusiasm which carries through from research to production.

Recruiting—Part of Dr. Larson's responsibility is to find and keep scientific personnel. He concedes: "It takes every resource at our command to keep our staff growing."

A few recruiting methods: 1. Under the auspices of UCC, universities set up fellowships in physics, chemistry and metallurgy. 2. Key personnel from the various UCC research centers keep in close touch with the colleges and universities in their areas. 3. The laboratory director and assistant directors are alert to recruitment needs, and encourage all technical personnel to be on the lookout for people they think might be interested in joining the research staff. 4. Work with university groups on scientific projects often interests undergraduate and graduate students in joining National Carbon's research group.



Production of vacuum cleaners is stepped up at Hoover Co.

Housewares Hit Jackpot

Informal, convenient living spurs demand for small electric appliances. Since 1949, sales have soared from some $500 million to nearly $1.5 billion

SMALL APPLIANCE makers—producers of everything from vacuum cleaners to toasters—are looking forward to their best sales year ever. When the Christmas spree is over, a little under $1.5 billion will have been spent at retail for their products in 1956, some 20 per cent above 1955.

Production lines are at capacity. Westinghouse Electric Corp. has laid off some temporary workers which it hired to refill strike-emptied pipelines at its appliance division, Mansfield, O., earlier this year. But many housewares lines at the same plant are working two and three shifts. McGraw Electric Co., Chicago, maker of the Toastmaster, is also stepping up output.

Money Talks—Basic to the continued growth of small appliance sales is the fact that while prices have been held down, value is increased. Illustrates O. M. Mansager, executive vice president, Hoover Co., Canton, O.: "Thirty years ago our standard model sold for $77.50. We put out a better product today for $69.95."

Leading makers have abandoned fair trade. General Electric Co. set the pace for others this year by reducing prices across the board. Steam irons, for example, which were selling strongly at $17.95, were cut to $14.95. In part, cuts are being made at the expense of the 50 per cent average spread between factory and dealer charges, the 40 per cent spread between factory and department store prices.

New Concept — There's a more fundamental side to lower prices. The industry is moving more and more toward the high volume, low markup concept as its key to growth. At the production level, this implies advancing as fast as possible toward automation. At the distribution level, it implies gearing the over-all sales effort to move the output fast.

Heavy advertising is being carried on to presell the consumer. GE's small appliance budget this year is estimated at over $15 million, with the accent heavy on cooperative advertising at the local level. Though Westinghouse won't put a figure on its advertising spending, it agrees that it's putting out much more than ever before. Manufacturers are shouldering more selling functions which used to be assumed by retailers, as a means of getting better control of their markets.

Hooker—The big companies are discovering that some product flexibility must be sacrificed to achieve

high volume, low cost production. Tooling has to be designed with flexibility in mind. Hoover for example, has put through six model changes in the last two years. But, inevitably, the trend is for large companies to compete for the large markets.

There are good opportunities for smaller makers to prosper by concentrating on specialty products. In the last few years, for example, a new group of companies has built a new industry in broiler-rotisseries within the small appliance field.

Growth—You can never tell when a specialty product will become an industry staple. The broiler and other new items like electric frypans, steam irons, portable mixers and various types of specialized fans have jumped from 6.7 to 38.5 per cent of the small appliance market since 1949.

Many smaller companies are doing a healthy business in products like coffee grinders, knife sharpeners, hair dryers, water boilers, tea kettles, corn poppers and electric pressure cookers.

Outlook — The small appliance future looks good. Some makers are betting on another sales gain of 20 per cent. New model introductions in January and July will again be timed to get production lines rolling for the Mothers'-Fathers' Day season and for Christmas.

Says one GE spokesman of the small appliance field: "Over the next ten years 80 per cent of our business will come from products not even on the market today."

Homebuilding, family formations and personal disposable income will stay up next year. But it's a sure bet that the auto industry will be making bigger demands on those dollars. How much time payments on autos will take from the small appliance market is the big question mark in the 1957 outlook.

** An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.*

Big Sales in Small Appliances

(Millions of dollars, retail value)

	1956*	1955	1954
Blenders	$17.2	$14.4	$11.8
Broilers	92.6	77.2	75.9
Clocks	60.0	50.0	47.9
Coffee Makers	86.0	71.7	68.7
Cooker-Fryers	47.7	39.8	43.7
Electric Blankets	48.5	40.5	37.7
Fans	223.3	186.1	234.7
Fryer-Skillets	60.6	50.5	26.4
Heaters	54.1	45.1	34.2
Heating Pads	14.1	11.8	10.9
Hot Plates	6.7	5.6	5.9
Irons	137.7	114.8	95.1
Mixers	123.8	103.2	76.2
Roasters	15.7	13.2	13.9
Toasters	67.5	56.3	52.2
Waffle Irons	22.6	18.9	17.3
Vacuum Cleaners	355.4	296.2	258.6
Totals	$1,433.5	$1,195.3	$1,111.1

*1956 estimated by STEEL.
1955 and 1954, *Electrical Merchandising.*

The Atom Goes to Sea

Babcock & Wilcox Co., New York, under contract from the U.S. Maritime Adminatration, will evaluate a pressurized water, nuclear reactor system for the merchant marine.

The study is part of a program of nuclear power development initiated by Clarence G. Morse, Maritime administrator, late last year. At that time, bids were requested from reactor manufacturers for a 20,000-hp ship reactor.

Louis H. Roddis, director of reactor development for the Atomic Energy Commission, predicts sea trade routes will change with the coming of nuclear powered ships.

Seaway 15 Per Cent Finished

American work on the St. Lawrence Seaway was 15 per cent completed on Sept. 1, says Lewis G. Castle, administrator.

About $75 million has been obligated by the U.S. Our share of the $300 million project is limited to $105 million.

More Sintering Ahead

Sintering is experiencing a rapid growth in popularity in steel mills, reports the American Iron & Steel Institute.

Eighteen new machines, with a total annual capacity of over 25 million net tons, are scheduled for completion before the end of 1957. Adding 103 machines now operating, the new facilities will bring sinter capacity to 63 million net tons a year.

Sintering machines convert fine particles of iron ore and flue dust that might otherwise be lost into a usable blast furnace charge. They help increase furnace output and cut down coke consumption, explains AISI.

Fast Tax Grants

Between Aug. 23 and Sept. 19, the Office of Defense Mobilization issued 42 certificates for accelerated tax amortization amounting to $111,292,114. Of this total, $67,651,000 was for electric power generating facilities. Other major beneficiaries include military aircraft and electronic equipment producers.

How Great Lakes Steel *launches* quality

You're at 400 feet, banking for a good close look at the unloading operation of the *Ernest T. Weir*. She's packed to the gunwales, stem to stern, with ore—tons of iron-bearing food for Great Lakes hungry blast furnaces.

What's this got to do with turning out top-quality steel at Great Lakes? Plenty! For quality pig iron can only come from quality raw materials—like the *Weir's* rich cargo. And, of course, quality pig iron is the very backbone of top-quality steel.

Control of quality at Great Lakes begins right at the mines. In fact, each ore source is picked with painstaking care. Then, repeated checks in the mines—*double checks* here at the unloading docks—put the quality of Great Lakes raw materials beyond question!

It's that kind of control (from start to finish) that gives our flat-rolled products uniform quality—assures that they will reach our customers exactly when and as ordered. We're ready to talk your steel needs whenever you are.

GREAT LAKES STEEL CORPORATION

Detroit 29, Michigan • A Unit of

NATIONAL STEEL CORPORATION

District Sales Offices: Boston, Chicago, Cincinnati, Cleveland, Grand Rapids, Houston, Indianapolis, Lansing, Los Angeles, New York City, Philadelphia, Pittsburgh, Rochester, St. Louis, San Francisco, Toledo, Toronto.

TO ASSURE TOP-QUALITY OPEN-HEARTH STEEL . . . iron ore (shown stockpiled here), coal and limestone—all of known source and quality—are sampled and tested over and over again by Great Lakes Steel raw material analysts.

Volkswagen

U. S. Sales	
1956	62,000
1957	76,000

MG-A

U. S. Sales	
1956	5,000
1957	6,500

Volvo

U. S. Sales	
1956	1,900
1957	3,600

U.S. Likes Foreign Cars

FOREIGN CARS are gaining a bigger slice of the American market. Sales this year will be close to 90,000 units, compared with 58,000 in 1955. Next year should see between 110,000 and 120,000 sales.

Sports car enthusiasts still make the biggest play for overseas products, but foreign carbuilders are plugging small, economical family cars. They've found the suburban housewife is a likely prospect for an easy handling auto for marketing and shuttle service to and from school and commuter trains.

Volkswagen — Since 1953, the biggest hit in this line has been Germany's Volkswagen. Although its sales have doubled every year, 1956 will not quite equal the 70,000 goal set by VW executives early in the season (see above). Overseas shipping strikes have held up entry into U.S. ports.

Despite the import bottleneck, VW's port of entry price tag ($1595) has made it the biggest seller so far. Wood Motors, Detroit, reports a five-month order backlog for the runabout. Other dealers around the country have the same happy complaint.

Competition—The closest competitor unitwise is the British MG-A ($2195). It's aiming for 5000 U.S. sales this year, hopes for 6500 in 1957. But the MG-A falls strictly into the sports car class and can't compete with the VW except for shipping space. This makes it another hard-to-get auto.

Besides these "volume" imports, a host of foreign family-style cars is filtering into the country. Some examples: Citroen 2 CV (French), Hillman Minx (British), English Fords and the SAAB (Swedish). They range from $1100 to $2500 and offer degrees of economy and size.

Newcomer—One of the latest is Sweden's Volvo PV444. With the exception of price ($2120, port of entry, Los Angeles), Volvo seems to have most of the advantages and few of the faults of other imports. Introduced on the West Coast in August, 1955, Volvo will rack up sales of about 1900 units this year, aims at 3600 or more next year.

Even the higher price should not limit its acceptance. Foreign car buyers fall into a category separate from Ford, Chevvy and Plymouth owners. They want small car size and economy, plus dependability and long life. Cost is becoming a secondary (though still important) factor.

Service—Economy and service aren't important to the speed addict who buys a sports car, but a lack of parts and service has soured many prospective buyers of the more functional imports. Volvo is changing this.

The company still has distributors in Los Angeles and in Texas, but it's setting up dealerships on the East Coast and in the Midwest. Its headquarters for parts is in Detroit. Dealers will be carefully trained; service will be a big sales point. Volkswagen has a similar

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setup. Some British outfits are beginning to follow suit.

Dependable—Besides the service angle, Volvo offers a well built car, which carries a standard 90-day or 4000-mile guarantee. In Sweden a Volvo is guaranteed for five years.

The car has integral body-frame construction. It is 177 in. long, with a 102.5-in. wheelbase. Height is 61.5 in.; width is 62 in. This makes it larger than the VW and most other imported autos. Coil spring suspension makes for a smooth ride.

Weight of the steel body is 629 lb. Total weight runs 2260 lb. Volvo buys 20,000 tons of hot and cold-rolled steel from U.S. producers annually. H. A. Towers, assistant purchasing agent for Volvo in this country, says the company probably will up its steel purchases in the U.S. by 10 per cent in 1957.

Tests—The PV444 indicates it will average 30 miles a gallon under normal conditions. Its engine is a 4-cylinder, in-line job, with overhead valves capable of racking up 70 hp at 5500 rpm. The compression ratio is 7.8 to 1. The fuel system features dual SU carburetors.

Top speed hovers close to 90 mph, but handling gets a little tricky above 60 mph. Below that speed, the car is easy to drive and corners extremely well for its size. Hydraulic brakes are more than adequate, even for crowded American highways.

The gear shift is on the floor, and the transmission is designed for a fast pickup in low (35 mph in 5 seconds); it's slightly less adequate in second and high. The hood is hinged at the front and swings way up to allow easy access to the engine. Its trunk area competes with that of low priced, Big Three cars.

Styling—The Volvo leaves something to be desired for those accustomed to long, low silhouettes. Its body resembles that of a 1940 Ford. The company hasn't changed basic design since 1946 and probably won't for several years. Foreign manufacturers like to keep resale values high; yearly facelifts drop trade-in prices.

Finish — Besides excellent construction, the PV444 has a finish which will make Continental Mark II owners envious. A 262-ft Rotodip unit thoroughly cleans, Bonderizes and primes all bodies at the factory. Hand spraying and plenty of polishing provide a hard, glossy finish.

Seats are designed to give lots of legroom in front and keep back seat riders from getting cramped. Both front seats slide on tracks and can be removed. The right-hand seat release lever is hard to reach and should be relocated on the right side. Seats can be changed into car beds with an optional conversion kit.

Strong, solid construction and good service are two big reasons why the Volvo PV444 should find a ready market among foreign car buyers who don't mind paying extra for quality.

Eaton Expands Division

Eaton Mfg. Co., Cleveland, has scheduled a $3.5-million expansion program for its axle division.

It includes the purchase of $2,555,000 of new production machinery and equipment. Of the divisions 1500 machine tools, 1200 will be moved in changing from departmentalized to straight-line production.

Construction will add 135,000 sq ft.

U.S. Auto Output

Passenger Only

	1956	1955
January	612,079	659,508
February	555,596	675,495
March	575,234	794,015
April	547,766	753,851
May	471,533	724,892
June	430,279	649,393
July	448,804	659,763
August	401,997†	614,493
8 Mo. Total	4,043,288†	5,531,410
September		461,591
October		517,813
November		749,061
December		682,257
Total		7,942,132

Week Ended	1956	1955
Sept. 1	58,233	85,851
Sept. 8	47,771	79,366
Sept. 15	64,350	122,263
Sept. 22	35,652	123,109
Sept. 29	37,749†	115,723
Oct. 6	45,000*	80,271

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

Exhaust Notes

• Hoffman Motor Car Co., New York, has been assured the Mercedes-Benz distribution contract for several years, claims Max Hoffman, president. Rumor had it that Studebaker-Packard Corp. might get the franchise as a result of the three-way link between S-P, Curtiss-Wright Corp. and Daimler Benz Co. of Germany.

• James J. Nance, former head of Studebaker-Packard Corp., has received a $286,000 settlement from the company in return for his resignation as president. Mr. Nance's contract wasn't due to expire until April, 1963. He also gives up certain salary and stock option rights. Mr. Nance will be on a regular salary ($150,000) until the end of January.

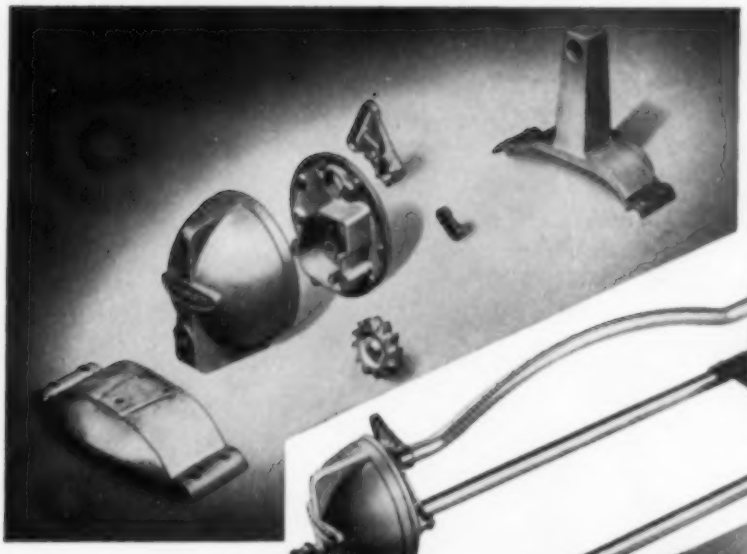
• De Soto Division, Chrysler Corp., will introduce Captive-Air safety tires on its Explorer station wagons in 1957. Made by Goodyear Tire & Rubber Co., Akron, these jobs do away with the need for a spare.

• More rumors about Ford Motor Co.'s E car put it in the larger sized sports car field; quite possibly in direct competition with Studebaker's Hawk series and the four seated Ford Thunderbirds which are expected to bow shortly. The E car grille supposedly is a vertical oval shape made of anodized aluminum.

• Ford's Tractor & Implement Division, Birmingham, Mich., announces a disc tiller and one-way plow. Tubular steel frames and high carbon steel discs turning on sealed ball bearings are used in the implements. The 26-in. discs are heat treated.

• Almost 27.6 per cent of all cars sold in the New York area still have 6-cylinder engines, reports M. C. Patterson, president of Chrysler Corp.'s Dodge Division. A 10-per-cent ratio holds in Philadelphia, Boston and Chicago, 6 per cent in Cincinnati, Cleveland, Pittsburgh, Detroit and Syracuse, N. Y.

• H. B. Daniels, general sales manager of Ford's Lincoln Division, estimates that auto air conditioner sales should increase by 15 to 20 per cent next year. This year's sales are 40 per cent higher than 1955's.



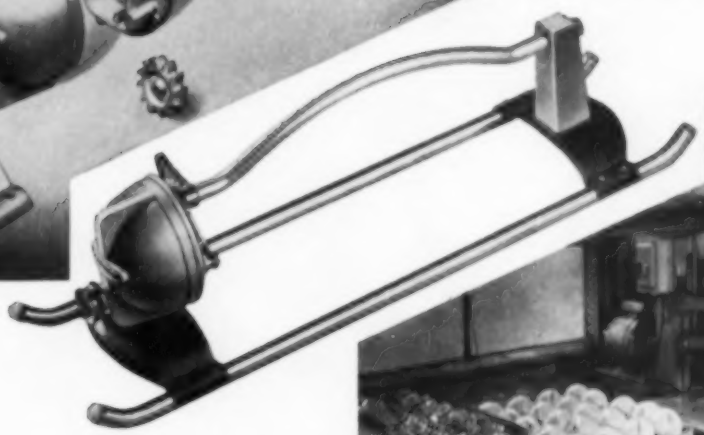
PRODUCTION SHORT CUTS

WITH

ZINC

DIE CASTINGS

NUMBER 4
OF A SERIES



A back and forth motion of the Swingin' Spray sweeps a uniform rain-like spray over a rectangular area of up to 2400 sq. ft. Its "Perma-Sealed" motor unit completely separates the water flow from the motor. Grit and dirt stay out—lubrication stays in!

Covering the ground at MELNOR

Melnor's Swingin' Spray oscillating lawn sprinklers were designed to be sold with a year's unconditional guarantee. This means, of course, that they have been built to high engineering and manufacturing standards. Thus the selection of ZINC Die Castings for seven of the principal assembly components is of special significance.

Because of the unusual contours of the components illustrated, it is obvious that die casting is the most practical method of production. And, when all of the requirements of strength, weight and corrosion resistance were fully considered, Melnor engineers found that ZINC alloy was the metal that would do the job best—at lowest cost. All holes, recesses and projections are obtained in the casting operation, thus greatly minimizing secondary work prior to assembly, and the smooth, as-cast surfaces of four of the parts are easily and economically coated with bright yellow and dark green enamels.

Send for your copy

The production and sales advantages imparted to this motor-driven sprinkler by ZINC Die Castings are typical of those found in a wide variety of products. For 80 additional examples send for our booklet "The End Uses of Zinc Die Castings" and ask any commercial die casting company for die casting design assistance to improve *your* products.

ZINC
FOR DIE CASTING ALLOYS

The New Jersey Zinc Company, 160 Front St., New York 38, N. Y.

The research was done and the Zamak die casting alloys were developed with

HORSE HEAD SPECIAL (99.99 + % Uniform Quality) ZINC

Prehistoric monster?

No. You're looking at the *world's largest dredger* . . . a hungry man-made monster of a machine that can move a mountain of earth in a day.

Imagine the brute power it takes to move this behemoth—even more, the joint-strength it needs to hang together despite the strains and stresses it undergoes! It typifies what's been happening in the earthmoving equipment field. They're making them bigger, more powerful, more rugged.

What helps hold such hard-working equipment together?

Plenty of standard *nuts and bolts.* They have to be strong and flawless, these fasteners . . . completely reliable.

RB&W—A MAJOR AND RELIABLE SUPPLIER

A leader for 111 years, RB&W turns out the finest quality fasteners possible — for the heavy equipment field as for so many other major fields in industry. *Modern facilities, new techniques, long experience* . . . all combine to make RB&W fasteners truly the "strong point of any assembly".

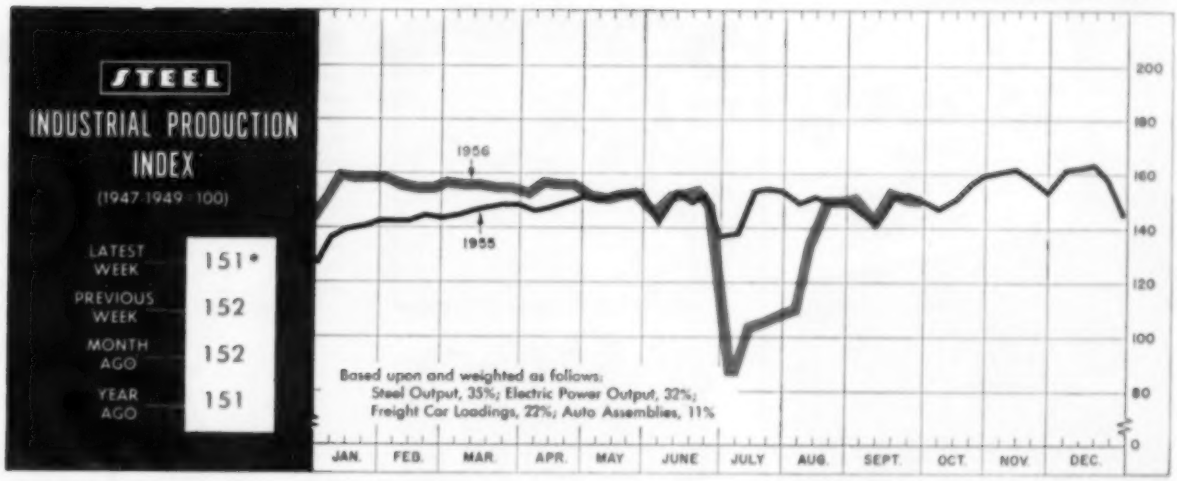
CONTACT THE RB&W "FASTENER MAN"

Proper application of standard fasteners can save you money. Ask the RB&W "Fastener Man" to show you how. Contact your nearest RB&W office.

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

Plants at: Port Chester, N. Y., Coraopolis, Pa.; Rock Falls, Ill., Los Angeles, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. **Sales agents at:** Milwaukee; New Orleans; Denver. **Distributors from coast to coast.**

RB&W FASTENERS - *Strong Point of any assembly*



*Week ended Sept. 29.

Orders, Sales Spur on Fourth Quarter

BUSINESS is heading down the home stretch, and it's geared to set some records.

Comparison of this year and record 1955 is inevitable. Despite poor showings of automotive and agricultural machinery, the odds have favored 1956 most of the time. The exception was the strike period. A look at STEEL's industrial production index chart above shows why. Last year showed an uptrend from start to finish, with a strong push in the fourth quarter. This year started and stayed on that high level, so comparisons have been favorable. If this fourth quarter continues that pattern, 1956 will be the best year ever.

Good Signs—One of the best reasons for optimism about this quarter's record-breaking chances is the rate at which new orders are pouring into durable goods industries. Since the end of the strike, this trend has been sharply up. That is the word from manufacturers issuing third quarter reports. More recent confirmation comes from purchasing agents. These men are definitely bullish, not only about the fourth quarter but also as far ahead as mid-year, 1957.

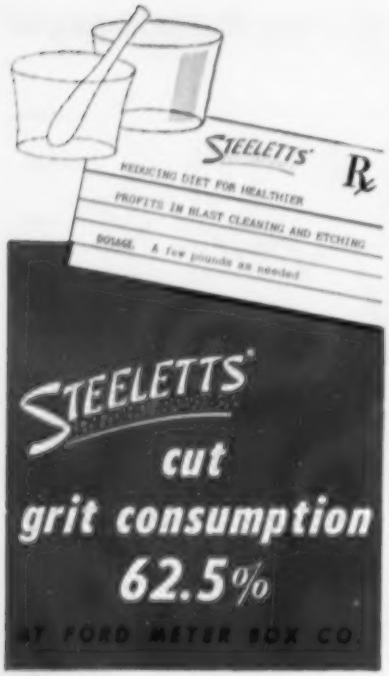
The September report of the National Association of Purchasing Agents shows that 55 per cent believe this quarter will surpass the 1955 period, while only 18 per cent think it will not. This is based largely on the fact that large bookings are pushing up production schedules. Over 90 per cent of those questioned report production equal to or better than that in August. Another indication of heavy business is that buying policies are still in the 60-90 day range. There is some movement toward slightly longer lead times, especially for hard-to-get steel items.

Upsurge — In Cleveland, where you can find practically all forms of metalworking, purchasing agents say there is an upsurge of inquiries which will result in continued high volume of new business. In September, 53 per cent of

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,495[1]	2,502	2,334
Electric Power Distributed (million kw-hr)	11,450[1]	11,482	10,627
Bituminous Coal Output (1000 tons)	10,145[1]	10,650	9,515
Petroleum Production (daily avg—1000 bbl)	7,050[1]	7,063	6,661
Construction Volume (*ENR*—millions)	$483.4	$380.7	$266.0
Auto, Truck Output, U. S., Canada (*Ward's*)	54,540[1]	52,718	144,534
TRADE			
Freight Car Loadings (1000 cars)	820[1]	822	820
Business Failures (Dun & Bradstreet)	262	203	171
Currency in Circulation (millions)[3]	$30,714	$30,810	$30,323
Dept. Store Sales (changes from year ago)[3]	+8%	+4%	+11%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$23,154	$20,317	$24,341
Federal Gross Debt (billions)	$274.4	$274.5	$277.4
Bond Volume, NYSE (millions)	$18.3	$18.3	$37.5
Stocks Sales, NYSE (thousands of shares)	9,788	10,449	21,694
Loans and Investments (billions)[4]	$85.8	$85.9	$84.5
U. S. Govt. Obligations Held (billions)[4]	$26.4	$26.5	$30.5
PRICES			
STEEL's Finished Steel Price Index[5]	225.71	225.71	207.63
STEEL's Nonferrous Metal Price Index[6]	264.3	265.0	264.6
All Commodities[7]	115.2	115.1	111.4
Commodities Other Than Farm & Foods[7]	122.6	122.6	118.0

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1956, 2,461,893; 1955, 2,413,278. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100



Steeletts have brought the stamina of steel to grit blasting and are rewriting the story of grit consumption. At Ford Meter Box Co. of Wabash, Indiana, for instance, 75 lbs. of Steeletts do the work of 200 lbs. of chilled iron grit in cleaning and etching non-ferrous castings. This 62.5% reduction in abrasive consumption results from Steeletts' resistance to breakdown.

Chilled iron broke down quickly into fine particles which were drawn off by the dust collector, causing frequent addition of new grit. The Indiana firm also reports Steeletts produce a better finish on the castings while reducing abrasive consumption.

Wherever an etched finish is required, Steeletts bring savings in cleaning time, abrasive consumption and equipment maintenance. Let them make savings for you.

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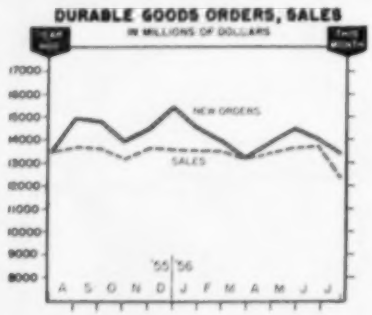
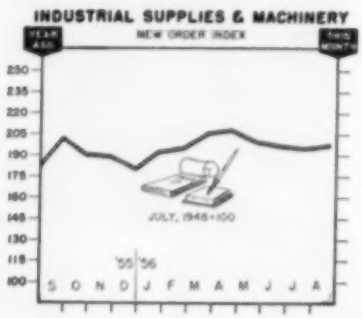
THE BUSINESS TREND





	New Orders* 1956	New Orders* 1955	Sales* 1956	Sales* 1955
Jan.	14,683	12,142	13,506	11,850
Feb.	14,107	12,170	13,593	12,029
Mar.	13,337	13,353	13,294	12,860
Apr.	14,073	12,879	13,519	12,805
May	14,732	14,331	13,754	13,322
June	14,185	14,033	13,850	13,527
July	13,497†	13,571	12,501†	13,503
Aug.	.....	15,145	.....	13,745
Sept.	.....	14,936	.....	13,692
Oct.	.....	14,094	.....	13,261
Nov.	.....	14,680	.....	13,721
Dec.	.....	15,605	.....	13,688

*Seasonally adjusted. †Preliminary.
U. S. Office of Business Economics.
Charts copyrighted, 1956, STEEL.

	1956	1955	1954
Jan.	192.7	164.4	139.8
Feb.	195.9	175.1	140.5
Mar.	206.7	186.9	141.5
Apr.	208.6	173.7	131.9
May	200.6	191.6	129.4
June	197.5	189.1	136.4
July	195.6	163.7	119.4
Aug.	196.8	181.3	132.5
Sept.	.....	203.2	148.1
Oct.	.....	190.0	126.3
Nov.	.....	189.7	146.2
Dec.	.....	180.9	148.8

Amer. Supply & Machinery Mfrs.' Assn.

the members of the Cleveland group say new orders were better than they were a month before. Another 30 per cent say August and September were even. There is a strong movement to the 60-90 day buying period, with a year or more for some capital goods. More purchasers are reporting hand-to-mouth buying of heavy goods.

Sales are continuing at a near record pace, but they still lag behind new orders. The result is increased backlogs, extending well into 1957 in many cases. Available Commerce department figures go back to July, but they still point up the trend. Both sales and orders of durable goods dipped (see chart, above), mainly because of vacations and the steel strike. But unfilled orders went up a whopping $2 billion, one of the largest increases on record.

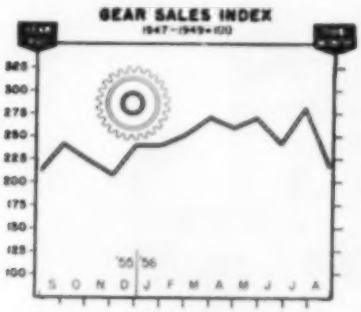
Industrial Supplies Gain

Indicative of the business trend is the report from the American Supply & Machinery Manufacturers' Association Inc. Its new order index (see chart above) advanced to 196.8 (July, 1948 = 100), reversing a four-month downtrend. While not back up to the peak reached in April, the index is better than it was in any month last year except October.

Manufacturers of resistance welding equipment also report an uptrend in orders and sales. The Resistance Welder Manufacturers' Association reveals that new orders passed the $5-million mark in August for the fourth time this year. During the first eight months of 1956, 70 per cent more business has been booked by association members than in the corresponding period of last year. Shipments peaked at nearly $6.5 million, bringing the total through August to $33 million, or more than all the dollar volume recorded in 1955. The backlog stands at about $18 million.

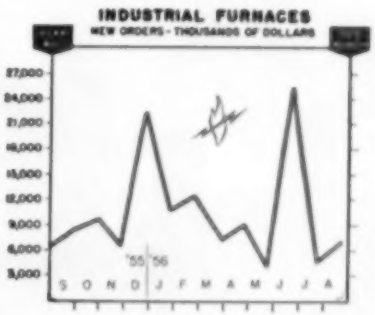
Gear Sales: Surprise Dip

Gear sales took an unexpected downturn in August. The index of the American Gear Manufacturers Association rode exceptionally high for eight months. From July to August it dropped 23.4 per cent. The reading of 219.5 (1947-49 = 100) was the lowest since last November (see chart, page 81). The monthly average of 258.8 for 1956 is still well ahead of the 1955 av-



	1956	1955	1954
Jan.	245.5	140.9	167.4
Feb.	256.2	148.5	165.1
Mar.	276.5	172.8	128.6
Apr.	264.7	179.8	158.2
May	275.6	205.2	132.5
June	245.4	193.5	127.4
July	286.7	201.7	141.3
Aug.	219.5	217.6	154.7
Sept.		246.5	135.1
Oct.		227.6	152.3
Nov.		210.4	116.7
Dec.		245.5	182.2

American Gear Mfrs. Assn.
Industrial Heating Equipment Assn. Inc.



	1956	1955	1954
Jan.	10.244	4.973	3.643
Feb.	12.163	5.616	3.086
Mar.	7.025	7.345	4.079
Apr.	8.803	7.639	3.496
May	3.620	6.205	5.848
June	25.597*	10.616*	5.663
July	4.140	4.338	1.664
Aug.	6.722	6.273	2.570
Sept.		8.351	2.534
Oct.		9.568	3.837
Nov.		6.180	3.188
Dec.		22,548*	6.847

*June, 1955, and 1956 and December, 1955, figures include steel mill furnace orders.

erage of 199.2. Gear manufacturers are confident there is no trend significance to the August figure.

Uptrend Takes Shape

STEEL's industrial production index is holding momentarily to the plateau around 151 per cent of the 1947-49 average. But automotive activity will spur an uptrend. Motordom is scheduling 511,400 assemblies for October, the heaviest programming since April, says *Ward's Automotive Reports*. All 1956 model production has ceased, and when General Motors Corp. joins the rest of the industry in full production of 1957 models later this month, weekly output will reach the 1956 high point.

On the basis of current reports, earlier predictions that the index will hit 166 (STEEL, Sept. 24, page 84) may prove conservative.

Steel operations have exceeded theoretical capacity for four consecutive weeks. The industry set a record during the week ended Oct. 7 with 2,502,000 net tons for ingots and castings, according to the American Iron & Steel Institute. The previous record of 2,483,000 tons was set in the week ended Apr. 15.

The big surprise is being furnished by railroad car loadings. They totaled 822,255 cars in the week ended Sept. 22, the highest figure in 47 weeks. The big difference between this year and last has been the increase in coal loadings. Through Sept. 22, railroads shipped about 30 million net tons more of bituminous coal than in the corresponding 1955 period, says the National Coal Association. The 13 regional shippers advisory boards of the Association of American Railroads predict that revenue freight shipments in fourth quarter will exceed the 1955 period by 3.7 per cent.

More Freight Cars Coming?

Champ Carry, president of Pullman Inc., dropped a hint that railroad car orders may see an upturn soon when he told the Cleveland Society of Security Analysts: "Many railroads are working on equipment purchase programs that should materialize before the end of this year." He feels that the roads agree with the statement of the Association of American Railroads that they will need 75,000 new freight cars a year for the next five years.

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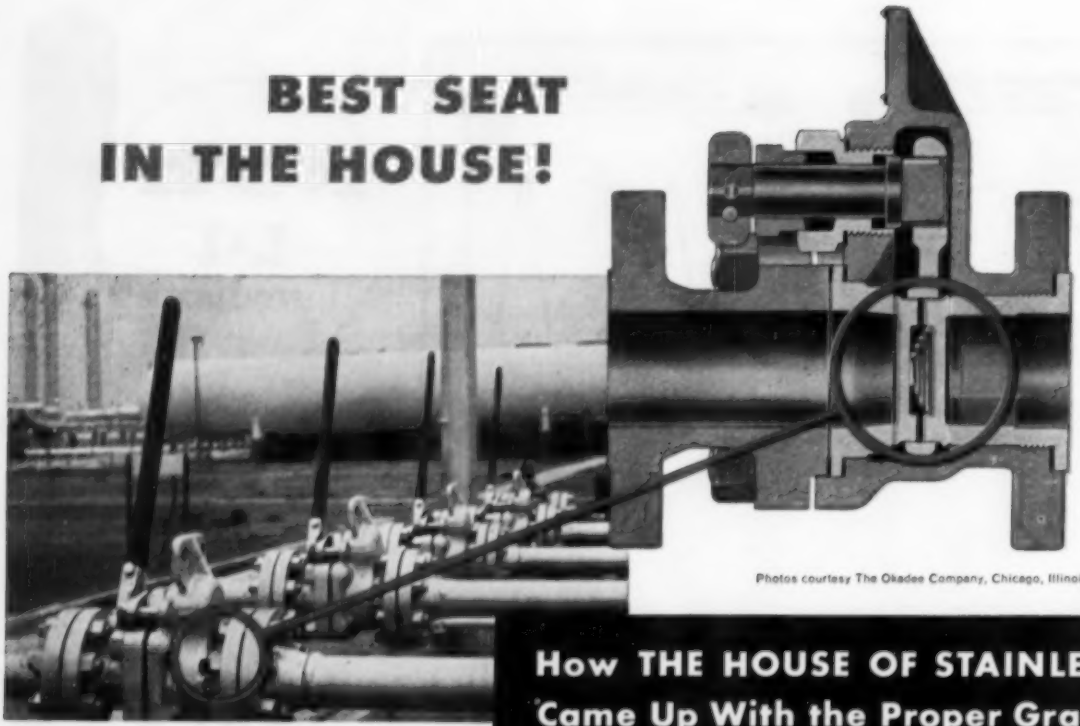

Photos courtesy The Okadee Company, Chicago, Illinois.

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THE NEED—In producing their line of non-lubricated valves, Okadee engineers were constantly searching for a better valve disc material. The various alloys and even certain types of stainless which they had used did not fully measure up to their exacting requirements. Long service life demanded a material that could be heat treated to extreme hardness and still maintain its corrosion-resisting qualities in handling a multiplicity of corrosive liquids and gases under high pressure.

THE ANSWER—Consulted on this problem, metallurgists at The House of Stainless recommended a specific grade of stainless steel that is heat-treatable to extreme hardness and does not lose its corrosion resistance during the process. In actual service, valve discs of this new material have met every requirement. Plus benefits of this stainless include ready adaptability to machining and processing as well as availability.

This is just another case in point—that the selection of the proper grade and type of stainless pays big dividends. Even if you don't need metallurgical assistance on some special problem, you'll find The House of Stainless a dependable source for prompt, personal attention to your stainless steel needs. Call LAfayette 3-7210 for shipments from our warehouse stock or mill deliveries through our mill placement department.

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EDWARD P. GILLANE
. . . to head Pratt & Whitney

Effective Nov. 1, **Edward P. Gillane** will become president of **Pratt & Whitney Co. Inc.**, West Hartford, Conn., and chairman of its subsidiary, Potter & Johnston Co., Pawtucket, R. I. He will succeed **Alexander H. d'Arcambal** in those positions. Mr. d'Arcambal will remain active in company affairs in a consulting capacity and as honorary chairman. Mr. Gillane became executive vice president of Pratt & Whitney last June. He previously was president-general manager of Potter & Johnston.

John C. Virden was elected president, **Eaton Mfg. Co.**, Cleveland, effective Jan. 1. A member of the executive committee since 1950, he succeeds **Howard J. McGinn** who continues as chairman. Mr. McGinn assumed the latter position early this year when **C. I. Ochs** retired from the chairmanship. Mr. Virden will resign as chairman of John C. Virden Co., which he has headed since 1919.

William A. Blume was elected a vice president, **Ross Gear & Tool Co. Inc.**, Lafayette, Ind., and general manager of its Gemmer Division, Detroit. **E. Douglas Graham** is vice president and assistant general manager, Gemmer Division.

W. W. Gilmore was elected a vice president, **Minneapolis-Honeywell Regulator Co.**, Minneapolis. He is president of Micro Switch Division, Freeport, Ill.

R. P. STEMMLER
. . . heads Vanadium-Pacific Steel

R. P. Stemmler was elected president of **Vanadium-Pacific Steel Co.**, Maywood, Calif., established by Vanadium-Alloys Steel Co. to distribute warehouse stocks of high speed and tool steels.

A. Lightfoot Walker was elected president and chief executive officer of **Rheem Mfg. Co.**, New York. He succeeds **Richard S. Rheem**, now chairman.

James Corcoran was made purchasing agent, **Dollinger Corp.**, Rochester, N. Y. He succeeds **Frank J. Wilson**, retired.

Theodore W. Bossert was made chief metallurgist, **Aluminum Co. of America**, Pittsburgh. He was assistant chief metallurgist, metal manufacturing divisions. He now heads the metallurgical division of the operating department.

Macwhyte Co., Kenosha, Wis., appointed **Russell J. Whyte** field sales manager.

William F. Wilson was elected executive vice president, **Gear Grinding Machine Co.**, Detroit. **William J. Taylor** was elected vice president-general manager, Republic Gear Co.; **Fred F. Miller**, vice president, Detroit Bevel Gear Co., both subsidiaries. The presidency of Republic will be left open temporarily. **Herbert S. Ries** resigned that position.

F. J. PURDY
. . . Westinghouse arc welding sales mgr.

F. J. Purdy was made sales manager of **Westinghouse Electric Corp.'s** arc welding department at Buffalo. He succeeds **A. J. Hendry**, now sales manager for the standard control division, Beaver, Pa. Succeeding Mr. Purdy as section manager of welding machine sales is **D. L. Maus. John H. Glass Jr.** was made purchasing agent, welding department.

Chedo P. Graham was promoted to chief engineer, **Aro Equipment Corp.**, Bryan, O. He was assistant chief engineer.

Walter H. Meyer was made sales manager, vacuum plating division, **Logo Inc.**, Chicago.

Arthur W. Kurz Jr. joined **Advance Plating Co. Inc.**, Detroit, subsidiary of Aluminum Industries Inc., as works manager. He resigned as general manager and vice president of Manufacturers Plating Corp. and Accessories Mfg. Corp.

Dr. J. Morley English was appointed to organize **Harvey Aluminum Structures**, division of Harvey Machine Co. Inc. The new division of the Torrance, Calif., company will engineer, fabricate and erect aluminum structures.

Richard A. Wolschlag was named to the new post of eastern regional sales manager for **Brainard**

MARVIN J. BAIR

JOHN C. CERCONE

. . . Pittsburgh Steel executive sales posts

Steel Division, Sharon Steel Corp. He has headquarters in New York.

At Midland, Pa., Works, **Crucible Steel Co. of America, Paul R. Brucker** was named division metallurgist-flat rolled products; **Michael Zetz,** division metallurgist-melting and bar products.

C. E. Heitman, assistant general manager, A. O. Smith Corp., resigned to become president of **Carter Carburetor Co.,** St. Louis.

R. S. Martin was appointed district manager, West Coast region, for **Airtemp Division,** Chrysler Corp. He has headquarters at the Dodge plant, San Leandro, Calif.

Robert P. Laughna was appointed director of planning and material control for **Chrysler Corp.'s** Automotive Group, Detroit. He was vice president-general manager, Packard Clipper Division, Studebaker-Packard Corp.

Lewis J. Purdy, vice president, **Dodge Division,** Chrysler Corp., has retired to establish an industrial consulting firm in Royal Oak, Mich.

Edwin J. Blanning was made assistant to general superintendent-cost improvement at the Gary, Ind., Steel Works of **United States Steel Corp.** He is succeeded as division superintendent-central mills by **Harry S. Spitz,** former chief engineer at the Homestead, Pa., Works.

Marvin J. Bair was elected vice president-sales, **Pittsburgh Steel Co.,** Pittsburgh. **John C. Cercone,** assistant general sales manager, succeeds Mr. Bair as general manager-sales.

Jack W. Qualman was made assistant chief engineer, **Detroit Transmission Division,** General Motors Corp., Ypsilanti, Mich. He will direct the division's future product design and development program.

Carl O. Newton succeeds **William J. Greene,** retired, as vice president and director of sales, **L. S. Starrett Co.,** Athol, Mass. **Cortland A. Bassett** succeeds Mr. Newton as general sales manager.

Korhumel Steel & Aluminum Co., Evanston, Ill., appointed **Calvin E. Bamford** assistant manager-aluminum sales. He was with Aluminum Co. of America.

Assistant sales managers for the mechanical division of **Hagan Corp.,** Pittsburgh, are: **Robert E. Blackwell,** administrative assistant-general sales; **Thomas J. Barthlow,** gas cleaning equipment sales; **Robert L. Nelson,** special engineering sales.

Noel L. Mudd fills the new post of director of marketing, **Burroughs Corp.,** Detroit. He is succeeded as general sales manager by **Ken T. Bement.**

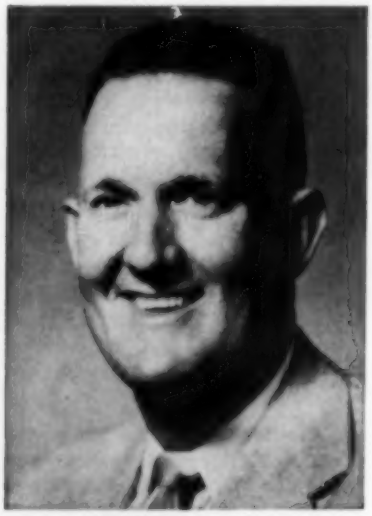
Edward H. Leimbacher was appointed assistant to the president, **Welding Fittings Corp.,** New Castle, Pa.

David C. Jones Jr. was made buyer in the purchasing department of **Lunkenheimer Co.,** Cincinnati. He replaces the late **Harry A. Fox.**

Howard M. Cutshaw was made general sales manager for Iron Fireman and SelecTemp heating equipment, **Iron Fireman Mfg. Co.,** Cleveland.

Ronald N. Campbell was named president, **Bryant Mfg. Co.,** Toronto, Ont., succeeding **Grant Marsh,** retired. **John H. Hobbs**

CARL O. NEWTON

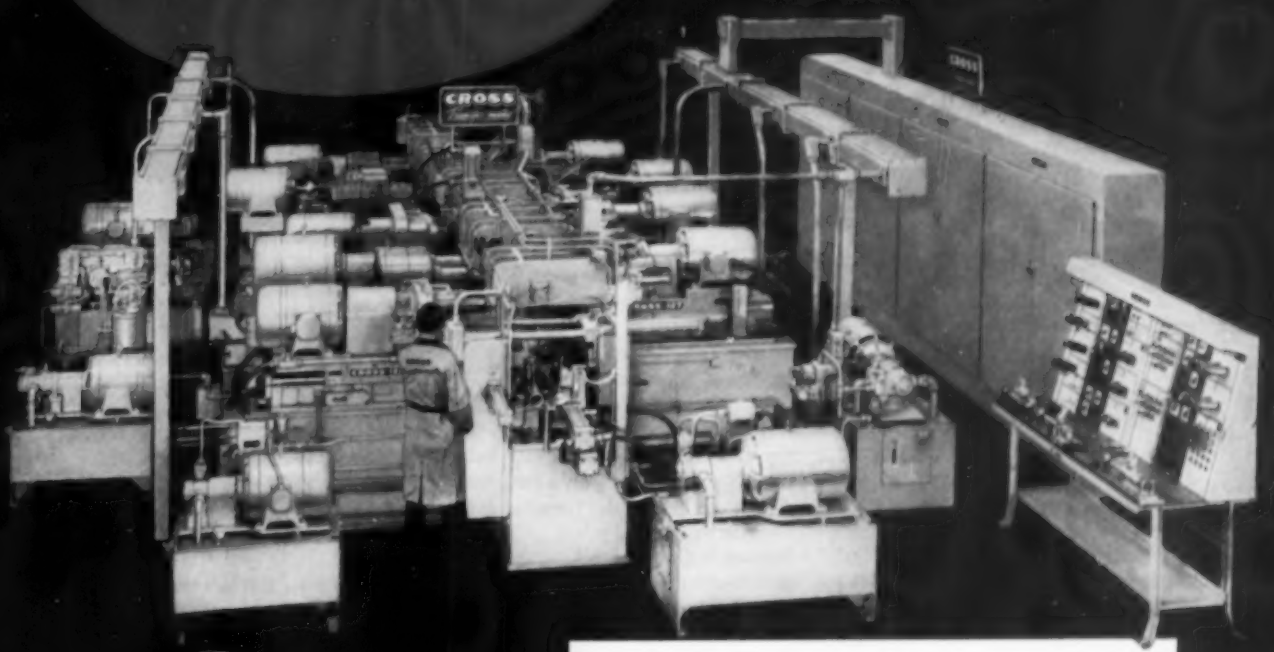


CORTLAND A. BASSETT

. . . executive posts at L. S. Starrett Co.

Bores, Drills Chamfers, and Taps Rear Axle Housings

Another Transfer-matic by Cross



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HOWARD B. JOHNSON
. . . Atlantic Steel executive v. p.

SANDFORD KRASKY
. . . Elizabeth Iron Works p. a.

EDWARD J. SIEGWARTH
. . . Leece-Neville factory manager

was elected vice president-general manager; **Earl Trevor,** vice president.

Howard B. Johnson was named executive vice president, **Atlantic Steel Co.,** Atlanta. He has served as vice president-sales and finance since 1949.

Michael J. Koenig, manager of market planning and sales research of **Redmond Co. Inc.,** Owosso, Mich., was made general sales manager.

Warren McKittrick was elected vice president, **Sparks-Withington Co.,** Jackson, Mich. He is general manager of Allied Steel & Conveyors Division, Detroit.

Charles C. Barnett Jr. was made a regional sales manager, **Western Brass Mills Division,** Olin Mathieson Chemical Corp., East Alton, Ill.

Sandford Krasky was made purchasing agent, **Elizabeth Iron Works Inc.,** Union, N. J. He was assistant purchasing agent.

Robert E. Stone Jr. was made Los Angeles district manager, industrial - automotive division, **Black & Decker Mfg. Co.,** Towson, Md.

Square D Co., Detroit, named **Walter Nollenberger** manager of a manufacturing plant under construction in Lexington, Ky.; **Stephen Kovach,** manager of a regional assembly plant under construction in Atlanta. Both plants are scheduled for completion in 1957.

Russell V. Ringquist was appointed field applications engineer in the midwest area for **Firth-Loach Metals Inc.,** McKeesport, Pa. He was a sales representative in the Rockford, Ill., area for Firth-Sterling Steel Co.

Edward J. Siegwarth was promoted to factory manager in charge of plant operations of **Leece-Neville Co.,** Cleveland. Formerly superintendent of Plant No. 1, he is succeeded by **Joseph T. Clark. Robert W. Reichard** was made superintendent of Plant No. 2. **Homer C. Hueffed** was made manager, industrial engineering department.

Sumner L. Barton was made sales engineer for **Control Engineering Co.,** Detroit. He was sales manager for the Saginaw division of Jackson & Church Co.

Oren D. Baker was elected president and chairman, **Baker Steel Supply Corp.,** San Diego, Calif. He succeeds his father, **James Baker,** retired.

Frank Mazzeo was made manager, Simplytrol Division, **Assembly Products Inc.,** Chesterland, O. He was with Tipp Mfg. Co.

OBITUARIES . . .

Erwin P. Claus, vice president-manufacturing, **Bristol Co.,** Waterbury, Conn., died Sept. 22.

Ralph J. Venning, 83, former president and chairman, **Cleveland Steel Tool Co.,** Cleveland, died Sept. 27.

Howard L. Dawson, 62, an assistant vice president for industrial engineering, **United States Steel Corp.,** Pittsburgh, died Sept. 22.

Donald B. Gillies, 84, a consultant and former vice president, **Republic Steel Corp.,** Cleveland, died Sept. 29.

Guy A. Wainwright, 66, president-chairman, **Diamond Chain Co.,** Indianapolis, died Sept. 26.

William J. Linney, 44, manager of **Republic Steel Corp.'s** iron ore mines at Mineville and Lyon Mountain, N. Y., died Sept. 23.

Cecil M. Morris, works manager, **United-Carr Fastener Co.,** Hamilton, Ont., died Sept. 17.

Frank B. MacArthur, 72, cofounder and former president, **Mac-Law Tool & Aircrafts Corp.,** Syracuse, N. Y., died Sept. 19.

Fred S. Gichner, 85, president, **Fred S. Gichner Iron Works Inc.,** Washington, died recently.

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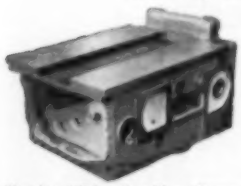

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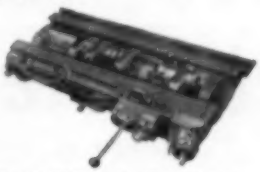

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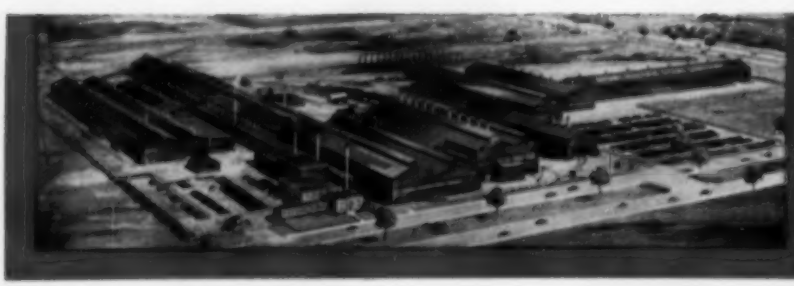

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Atoms for Peace

Industrial Reactor Laboratories Inc. will conduct research in privately owned reactor

TEN large concerns are undertaking a major research project on peacetime applications of atomic know-how. They have formed Industrial Reactor Laboratories Inc. to build and operate a privately owned nuclear reactor for research at Plainsboro, N. J.

Each of these companies will contribute an estimated $90,000 yearly for expenses: American Machine & Foundry Co., through its subsidiary, AMF Atomics Inc.; American Tobacco Co.; Atlas Powder Co.; Continental Can Co.; Corning Glass Works; National Distillers Products Corp.; National Lead Co.; Radio Corp. of America; Socony Mobil Oil Co.; and U.S. Rubber Co.

Gen. Walter Bedell Smith, president of AMF Atomics Inc., heads the company; H. L. Hilyard, treasurer of American Tobacco Co., is vice president.

Gets AEC Licenses — Nuclear activities are reported in other quarters. Babcock & Wilcox Co., New York, has become the first firm in the U.S. to obtain general licenses from the Atomic Energy Commission to receive and use special nuclear and nuclear source materials. Each license covers a five-year period ending in August, 1961, and applies to fuel element production operations in B&W's nuclear facilities plant at Lynchburg, Va. Thorium and natural and depleted uranium are the source materials being utilized; enriched uranium, the special nuclear material.

Babcock & Wilcox has revealed that it has "greatly reduced" production time in the manufacture of fuel elements at its Lynchburg plant. The building is undergoing an expansion of 150 per cent.

Edgewater Steel Sells Division

Edgewater Steel Co., Pittsburgh, sold its Tracy Kitchens Division to a newly formed company, Tracy Mfg. Co. President of the new organization is Maurice Parker. Edgewater Steel will concentrate on the expansion program now under way at its Oakmont, Pa., Works where it specializes in forged and rolled circular products.

Strip Mill in Operation

New cold-rolled strip steel production facilities are in operation at Cold Metal Products Co. of California's plant at 2131 S. Garfield Ave., Los Angeles (STEEL, Mar. 5, p. 79). Products include close tolerance, low carbon spring steel and alloy strip. Total plant service area occupied by the Warehouse and Mill divisions is 120,000 sq ft.

Forms Mountaineer Carbon Co.

Standard Oil Co. (Ohio) and Pittsburgh Consolidation Coal Co. have formed a jointly owned concern, Mountaineer Carbon Co., to operate a carbon calcining plant at Cresap, W. Va. The plant will have an annual capacity of 165,000 tons of high grade calcined carbon which is used principally as electrodes.

Sharon Renames Division

Sharon Steel Corp., Sharon, Pa., changed the name of its Detroit Tube & Steel Division to Dearborn Division, Dearborn, Mich. This division is a producer of special and regular grades of cold-rolled strip steel.

Twin Disc Clutch Opens Plant

Twin Disc Clutch Co. dedicated its plant in Racine, Wis. The first unit of this new plant provides 92,500 sq ft of additional floor space. The $2-million structure will be used for expanded production of models now turned out in the original Racine plant and at the Hydraulic Division's plant in Rockford, Ill.

Ingalls Gets Structural Work

A $3-million-plus contract was awarded Ingalls Industries, Birmingham, to furnish and erect the structural steel for Consolidated Edison Co.'s atomic generating station at Peekskill, N. Y. About 7000 tons of structural steel and 200 tons of steel for the stack will be fabricated in the company's

Sam Made The PANTS TOO LONG

PRESIDENT, THE CINCINNATI GEAR CO.

Some time ago I had a friend who decided (as I guess everyone has at some time) that the best way to get a good suit would be to buy some cloth that he particularly liked and then have the suit "made to measure" by a tailor. The purchase of the cloth presented no problem, but the selection of a tailor was another matter. He finally chose a small, inconspicuous one-man shop someone suggested to him; the poor fellow who ran it looked half starved, so he assumed he was about to get a real bargain.

After a reasonable wait, he got the suit; but it was a *terrible* fit. He went back for "alterations." It still fit poorly, but he didn't have the heart to go back again to the old man and tell him the truth — that his suit was no good. So, he gave the suit to his yard man.

The moral of this is clear — unless you're a gambler by nature, take your business to a shop that is big enough to do the job right in the first place, or to *make good* if it turns out wrong. This moral holds true whether you're buying suits or custom gears. Our reputation of nearly 50 years of virtually invariable customer satisfaction shows that we are equipped to do the job *right* — and *if*, by some chance, there *is* something wrong, we correct it to your complete satisfaction — almost quicker than you can say "Sam, you made the pants too long!"

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plants at Birmingham and Verona, Pa. Ingalls Steel Construction Co. will handle the erection work.

Denison Becomes Division

American Brake Shoe Co.'s subsidiary, Denison Engineering Co., Columbus, O., has been made a division of the company. Denison makes hydraulic presses, hydraulic pumps, motors and automatic controls in Columbus and Delaware, O., plants. A large addition to the Columbus plant is being completed.

Equips Puerto Rican Plant

United Drill & Tool Corp., Chicago, is installing $400,000 worth of machinery in the plant of its affiliate, Columbia Mfg. Co., San Lorenzo, Puerto Rico. The branch company will enter the field of small cutting too'ls manufactured for the U.S. do-it-yourself market.

Sabre Steel Opens Warehouse

Sabre Steel Service Inc. opened a warehouse and general offices at 4560 Bailey Ave., Amherst (Buffalo), N. Y. The newly organized firm has been appointed a distributor for tool, gage and die steels and drill rod made by H. K. Porter Company Inc.'s Vulcan Crucible Steel Division, Aliquippa, Pa. Peter Horey is president and secretary of Sabre.

Lummus Co. Sells Division

Lummus Co., New York, sold its Fabricated Piping Division, East Chicago, Ind., to Messrs. R. A. Steele and J. J. Friedman. They have organized a new company, Pipe Fabricators Inc., with offices at 504 W. 145th St., East Chicago, Ind.

Metal Hydrides Lets Contract

Metal Hydrides Inc., Beverly, Mass., awarded to Badger Mfg. Co., Cambridge, Mass., a contract for all equipment design engineering work necessary for the construction of its $5-million sodium borohydride plant. The plant is expected to be in production by early summer, 1957. It is part of Metal Hydrides' $13.6 - million prime government contract.

CONSOLIDATIONS

Van Norman Industries Inc., Springfield, Mass., plans the acquisition of **Bingham-Herbrand Corp.**, Toledo, O. Van Norman makes metal cutting tools; Bingham-Herbrand, metal stampings.

Continental Can Co., New York, and **Hazel-Atlas Glass Co.**, Wheeling, W. Va., have merged. Hazel-Atlas will be operated as a division of Continental.

Rheem Mfg. Co., Richmond, Calif., is acquiring **Standard Enameling Co.**, Culver City, Calif., and its subsidiaries, **Western Stove Co. Inc. and Western-Holly Appliance Co.** Rheem's Newark, Calif., plant will be closed and operations of its Wedgewood Division there will be transferred to Standard's plants in Culver City and McGregor, Tex.

Ferro Corp., Cleveland, purchased **Patterson Foundry & Machine Co.**, East Liverpool, O. C. W. Gerster was appointed president of Patterson, succeeding R. L. Cawood, retired. Patterson makes grinding, mixing and specialized processing equipment.

Crouse-Hinds Co., Syracuse, N. Y., purchased **Surveyor Service Co. Inc.**, Silver Spring, Md. The Maryland firm makes instruments, including seismographs, tide gages and automatic weather observation systems. Crouse-Hinds makes airport lighting and control tower equipment. Officers of the new subsidiary company are: President, J. R. Tuttle; executive vice president, R. J. Sloan; vice president, J. A. Kuhn Jr.; secretary, A. C. Stabler; treasurer, J. E. Clarke.

Bendix-Westinghouse Automotive Air Brake Co., Elyria, O., purchased **Servel Inc.'s Commercial Refrigeration Division**, Evansville, Ind., maker of electric motor-compressors for use by air conditioning and refrigeration manufacturers. J. R. Morrill will be the general manager of the new division at Evansville.

NEW ADDRESSES

Griscom - Russell - Schack Co. opened new offices at 901 Ridge Ave., Pittsburgh 12, Pa. The firm makes recuperators for the iron and steel, nonferrous metal, chemical and other industries.

Socony Mobil Oil Co. Inc. moved its headquarters to 150 E. 42nd St., New York 17, N. Y.

Automatic Switch Co. moved its Pacific coast factory branch to 1233 Goodrich Blvd., Los Angeles, Calif.

Karp Metal Products Co., a division of H & B American Machine Co. Inc., moved to 60 E. 42nd St., New York 17, N. Y.

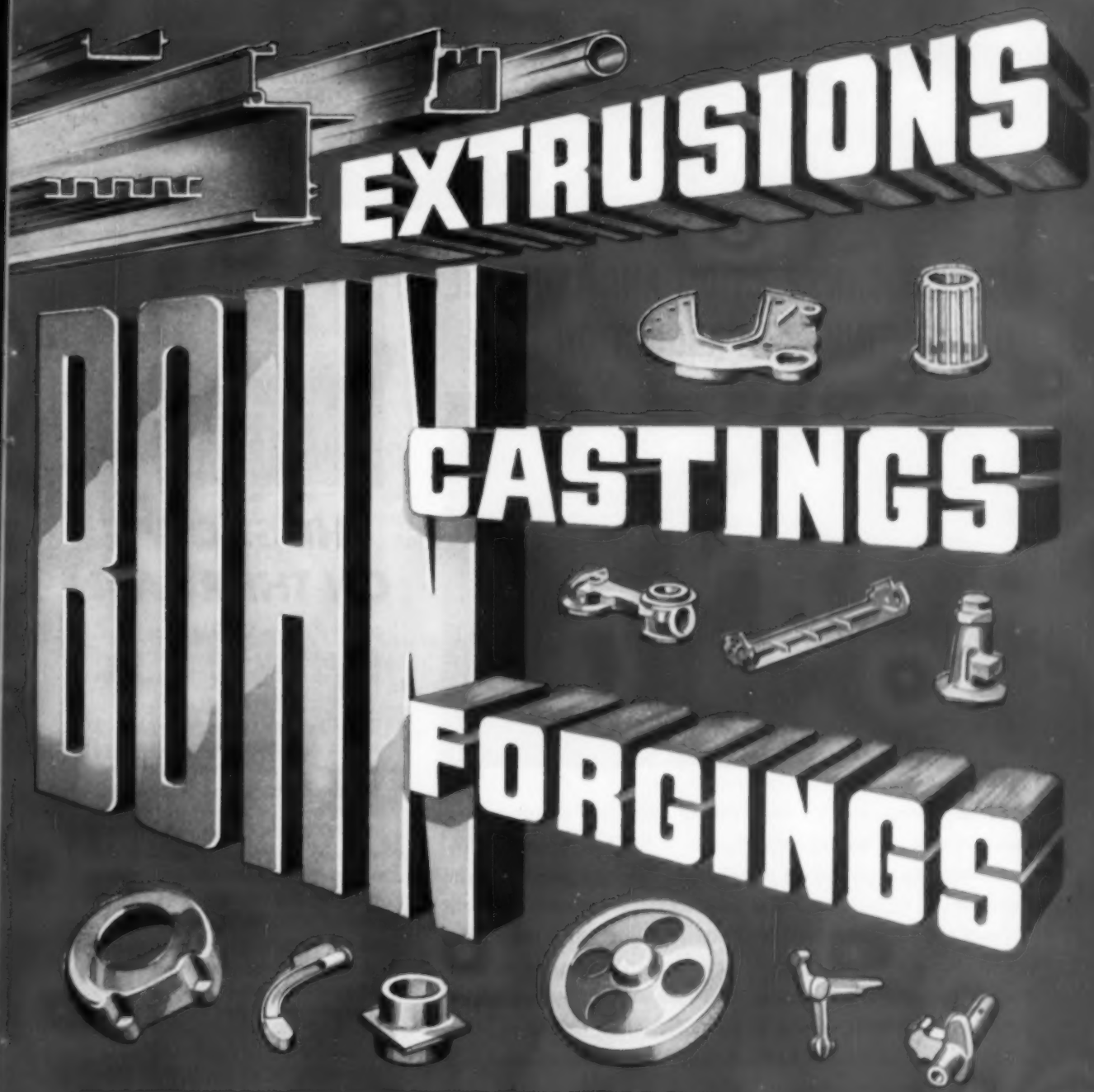
ASSOCIATIONS

Officers of **Association of Iron & Steel Engineers**, Pittsburgh, in addition to J. D. O'Roark, president (STEEL, Oct. 1, page 113), are: Leonard Larson, Republic Steel Corp., Cleveland, first vice president; Emil Kern, Allegheny Ludlum Steel Corp., Brackenridge, Pa., second vice president; S. C. Read, Jones & Laughlin Steel Corp., Pittsburgh, treasurer; and C. E. Pritchard, Alan Wood Steel Co., Conshohocken, Pa., secretary.

American Society of Civil Engineers, New York, elected: M. G. Lockwood, Houston, president; F. S. Friel, Philadelphia, and N. R. Moore, Vicksburg, Miss., vice presidents.

Morehead Patterson, president, American Machine & Foundry Co., New York, was elected chairman of the **Nuclear Standards Board, American Standards Association**, that city. Henry G. Lamb is secretary of the board.

William L. Crunk, Reynolds Metals Co., Louisville, was elected a vice president and director of the **American Management Association**, New York.



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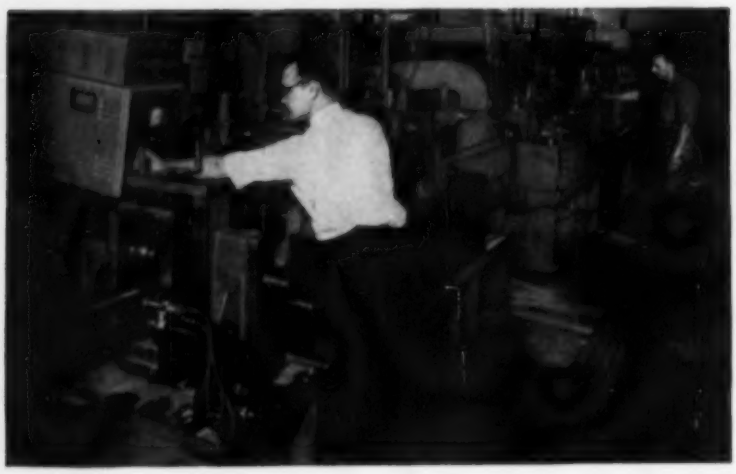

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Technical Outlook

METAL EXTRACTION— Look for organic solvents to play a bigger role in recovering lost metal values and in the treatment of marginal and problem ores, R. S. Olson, Dow Chemical Co., told the American Mining Congress last week. Copper and zinc recovery from dilute solutions and copper, nickel and cobalt separation, in particular, are applications that will probably be commercial in five to ten years, he stated.

MAGNESIUM ALLOY— Dow Chemical Co., Midland, Mich., developed the second in a series of high temperature magnesium alloys using thorium. Designed for supersonic aircraft and missiles, it stands 100 hours at 700°F with little effect on its properties.

INHUMAN— A ceramic may soon put the human hair out of the air conditioning business. As an accurate humidity sensing device, the new material, according to Horizons Inc., Cleveland, needs only 30 seconds to indicate a 90 per cent change in relative humidity.

MARCH ON— Compressor housings for air conditioners are being machined automatically. A Transfer-matic (Cross Co., Detroit) puts 18 rough castings an hour through 159 operations, delivers them ready for the assembly line.

ATOMIC GAS TURBINE FOR SHIPS— The AEC has asked Ford Instrument Co., a division of Sperry Rand Corp., to study the feasibility of building a gas-cooled nuclear power plant to propel a tanker. Most present concepts require an atomic reactor to heat water or liquid metal which is pumped through a heat exchanger to make steam which drives a steam turbine. The closed cycle, gas cooled reactor is different: It heats an inert gas which drives a gas turbine directly. Ford Instrument will investigate whether such a reactor could be built by 1961 for "a 707 ft supertanker with a capacity of 38,000 tons dead weight." Last month, the ship, the *John Sergeant* was launched with a 6000-hp General Electric gas turbine as the main propulsion unit. GE's gas turbine expert, A. A. Hafer, has proposed a design which makes it possible to adapt it to a nuclear, closed cycle gas turbine.

MIGHTY MITE— A miniature mill developed by Stanat Mfg. Co., Long Island City, N. Y., will make a mile of fine wire every 2 minutes. It will flatten a 1/16-in. round wire within 0.0005 in. tolerances. One of the reasons given for its success: Rubber belts are used to drive the synchronized recoiler.

DELICATE CARTON— Air suspension for trucks reduces the need for strong, tough containers, General Motors packaging experts say. Christmas tree ornaments, eggs, pretzels, glass and porcelain ware were packed in cheap lightweight containers and transported 10,000 miles in an air-ride truck without a single breakage.

ALUMINUM FINISHING— Working with abnormally large grains in a special aluminum alloy, Alcoa has come up with "Spangle-Sheet." Tailored for decorative jobs, it reflects light with a sparkle. Natural and color finishes have been produced. The material is not available in commercial quantities as yet. Reynolds also announces a new finish which is commercially available. The company is selling ¾, ⅞ and 1-in. tubing in colors. So far, it is marketing natural aluminum, blue and gold anodized tubing in satin, semibright and luster finishes.

Metalworking Outlook—p. 55 *Market Outlook—p. 133*

Hydrogen, oxygen, nitrogen: Metallurgy strives harder to get them out of metals and keep them out

Vacuum-fusion apparatus used for determining oxygen, hydrogen and nitrogen in metals at Battelle Memorial Institute, Columbus, O.

The Unseen Culprits

YOU DON'T see them, but they have been getting their names in the news. Often the story is bad: A turbine shattered, a jet plane destroyed. As you read down the column, you come across the telltale words: "Embrittlement (hydrogen, or oxygen or nitrogen) is suspected to be the cause."

Industry was concerned about these gases in metals long before the papers heard about them. They have been a daily annoyance: The cause of service failures and rejects for flaking, bulged coatings, strain aging, porosity, inconsistent drawing qualities and reduced physicals.

Questions—How do these gases enter molten metal? Is their progress in and out of solid metal controlled by diffusion or by other mechanisms? What form do they assume within the metal structure? To what extent are they beneficial? What is the maximum concentration that may be tolerated in different materials? What melting, refining and finishing techniques produce the lowest gas levels at reasonable cost? What heat treatments are required?

Research has begun to provide us with the answers to these questions—answers we must have to effectively control the problem gases.

Evidence—The two articles on the facing page tell part of the research story. Manley W. Mallett has drawn a picture of where we stand today, gas-in-metalwise, and hints at what is coming. John C. Helbling offers an example of detective work, typical of the results we are getting from research. In a nutshell, the situation they describe is this:

1. We have developed analytical methods that can tell us how much, where and in what form gas congregates in metal.

2. We have developed theories that picture what happens with gases in metals at the crystal level.

3. With this new knowledge, we are in a position to predict what will happen when gas and metal merge, and can plan how to prevent unfavorable situations.

Changes—Many of the things we have found out are having a direct effect on steelmaking practice and our methods of producing nonferrous metals. For example, the realization that much hydrogen pickup by molten metal comes from moisture has put emphasis on dry fuel and dry refractories.

The fact that the common deoxidizers have a profound effect on the nitrogen as well as oxygen in steel is now recognized and taken into account. Various methods of outgassing, such as vacuum melting and vacuum pouring have assumed prominence because of their ability to control gas levels. A big point in favor of the oxygen converter is its ability to produce low nitrogen steel.

A Trace—We think we understand now how such gas-metal effects as embrittlement, flaking and increased stiffness come about, but we need surer ways of preventing them. We do not understand how infinitesimal amounts such as 1 to 2 parts per million (by weight) of hydrogen can have such drastic effects, although the picture becomes clearer in terms of relative volume.

We would like to be surer of the conditions under which nitrogen forms nitrides, and the conditions under which the reactions reverse. Oxygen, nitrogen and hydrogen still present plenty of problems. When we solve them, the payoff will be metals that behave the way we expect them to.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, O.*

Gases in Metals

By MANLEY W. MALLETT
Consultant, Thermal Chemistry Group
Battelle Memorial Institute
Columbus, O.

POROSITY in castings must have concerned the earliest iron founders. It is still the only gas problem affecting some metals, such as aluminum. But we have come to recognize more subtle effects of gases. Typical of these is embrittlement.

The key to understanding the behavior of gases with metals lies in having reliable methods for determining the kinds and amounts present. Their deleterious effects on the familiar iron alloys and brasses and bronzes still plague us. We must meet stringent requirements on gas content to realize the potentialities of titanium, zirconium and molybdenum.

Vacuum-Fusion—Long years of searching have culminated in quantitative methods for determining oxygen, nitrogen and hydrogen in most metals produced in quantity. Most universal is the vacuum-fusion method by which nearly all metals can be analyzed for oxygen and hydrogen and in some cases for nitrogen.

The method involves melting a sample in vacuum. (The melting technique varies from metal to metal.) Oxygen yields carbon monoxide while both hydrogen and nitrogen come off as such. The evolved gases are analyzed by various methods, some so sensitive that from a 10-gram sample as little as one part in a million of oxygen or one part per 10 million of hydrogen, by weight, can be measured.

Chemical — Numerous other methods, mostly chemical, have been used to determine oxygen in metals. About the only one used actively today is the bromination method which was developed for titanium and zirconium. It is being extended to chromium, vanadium and steels.

Nitrogen in metals is usually determined by the solution distillation, wet-chemical method. The most popular version is the micro-Kjeldahl technique which is both economical and accurate. The vacuum-fusion method yields reasonably good nitrogen values for low-alloy steels, but recovers only a fraction of the nitrogen content of many other metals such as titanium and zirconium.

Diffusion—For metals such as titanium and zirconium, a hot diffusion-extraction method is used in which hydrogen is diffused from the solid metal at 2200 to 2650°F. Since hydrogen is the only gas evolved, analysis is reduced to a simple determination of gas volume.

Other metals have been analyzed for hydrogen by the diffusion-extraction method. In each case, temperatures and times are selected to be compatible with the melting points of the metals and their diffusion rates for hydrogen.

Culprits — Ferrous metallurgists face several serious gas-metal problems. Included are gas-induced embrittlement and porosity of weldments, hydrogen embrittlement of large forgings and disruption of the bond between babbitt facings and steel bases of friction

Blisters in Babbitt

By JOHN C. HELBLING
Materials Engineering Department
Westinghouse Electric Corp.
East Pittsburgh, Pa.

BABBITT on a large thrust bearing raised above the surrounding metal and wiped away in service. Babbitted thrust bearing shoes developed blisters in storage.

Tapping the blisters with a drill revealed the cause: Hydrogen, trapped at high pressure in the steel-babbitt interface.

We now realize that the hydrogen came not from the coating or surface pickling but from the base metal itself. Analyses revealed that the hydrogen content of AISI 1018 steel plates may be as high as 8.8 parts per million.

How Much—It is known that the hydrogen content can be reduced by heat treatment. However, the questions remained: What is the tolerable limit of hydrogen which will not diffuse in ordinary steels? What heat treatment can be used to reduce the hydrogen to this value?

Two experiments were set up to find the answers. The first aimed at ascertaining the tolerable level of hydrogen; the second was designed to establish a suitable heat treatment to obtain this level.

Diffusion—An SAE 1018 steel plate 7½-in. thick was selected for diffusion tests. (Maximum hydrogen was 5.5 parts per million.) It was sectioned into seven segments. These were heat treated to produce different levels of hydrogen content.

After heat treatment and analysis for hydrogen, each section was cut in half, machined, tinned and babbitted with a 90 per cent tin-8 per cent antimony-2 per cent copper alloy on five sides. The layer of babbitt was machined to a thickness of ¼-in. Before starting the diffusion tests, all babbitted surfaces were examined by ultrasonic techniques to locate any irregularity which might exist and influence the interpretation of the final results.

Heat—Each babbitted block was set up under an inverted electric roaster oven. An average of 250°F was maintained in the ovens.

At intervals, each block was inspected by ultrasonic methods to determine the soundness of the steel-babbitt interface. A break in this bond was determined by loss of the back reflections of the ultrasonic waves. In many instances, there was sufficient gas in the block of steel to rupture the bond and cause the babbitt to form blisters (Figs. 1, 2).

These blisters were the result of

Gases in Metals

bearings. Attracting less attention at the moment, yet of considerable importance, is the blistering of porcelain enamel, tin plate and electrodeposited metal coatings. Important too are the effects of gases on the ductility and toughness of special steels.

In nonferrous metallurgy, the major gas-metal problem today is embrittlement. Oxygen lowers the ductility of metals such as molybdenum and chromium, and hydrogen has a similar effect on zirconium and titanium. Probably the most critical problem is the hydrogen-embrittlement of titanium. Long-range bombers and supersonic fighter planes require titanium of unimpaired ductility.

Oxygen—In general, the problem of porosity caused by oxygen in ferrous castings has been solved by use of deoxidizers. However, we cannot entirely control porosity induced by the carbon-oxygen reaction in welding. Nor do we fully understand the effects of oxygen remaining in solid steel.

In unkilled (not deoxidized) steel, oxides combine with sulphides to form low-melting compounds which cause hot shortness or high-temperature brittleness. This condition is eliminated by deoxidation. But in free-cutting steels, strong deoxidizers such as aluminum, titanium or zirconium reduce machinability markedly.

Another important problem related to oxygen is that of its surface effects. For example, cast iron adsorbs oxygen. During porcelain enameling, this oxygen accumulated at or near the surface may lead to coating porosity.

Embrittlement—Even traces of oxygen cause embrittlement of molybdenum. An addition of one part per million of oxygen to molybdenum originally containing only two parts per million may destroy its room temperature ductility. Chromium also is embrittled by oxygen and this effect may be expected for other metals having extremely low solid solubilities for oxygen. It is generally caused by precipitation of the excess oxygen as a brittle oxide phase between the metal grains. Oxygen can be removed from molybdenum and chromium by annealing them in hydrogen, which has no observed detrimental effect.

Ti and Zr—Titanium and zirconium have solubilities for several per cent of oxygen by weight. A few hundredths of a per cent of oxygen is useful to strengthen and harden these metals, but several tenths of 1 per cent will render them hard and brittle.

Control of oxygen in these materials is obtained by melting and fabricating them under vacuum or pure inert gas atmospheres. Other highly reactive metals such as uranium alloys must be jacketed or incased in less reactive metals such as steel for fabrication by rolling. After working, the jacket has to be stripped away. High conductivity is obtained in copper by making it oxygen free, while the magnetic permeability of iron is greatly improved by removal of oxygen.

Nitrogen—The effects of nitrogen in ferrous materials may be attributed primarily to precipitation of a nitride phase. Precipitation is a gradual affair. Its deleterious effects depend on heat treatment and increase with time and slow strain rates.

Nitrogen causes brittleness in steel, but its effect is apparently

Blisters in Babbitt

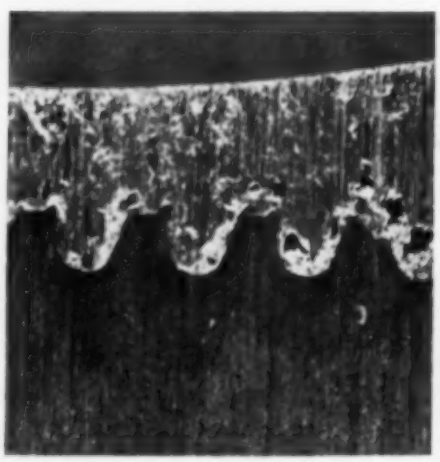
hydrogen diffusing out of the steel over 165 days at the test temperature. (All other test blocks were maintained under test for 233 days.) Two blisters were tapped and the escaping gas collected and analyzed. Both samples contained 95 per cent hydrogen and 5 per cent nitrogen.

Rate — Hydrogen will diffuse from steel even at room temperature. But the rate of diffusion is so slow at this temperature that indefinite periods would be necessary to reduce the hydrogen to a safe value. Since the diffusion rate increases with increasing temperature, the time required to eliminate the hydrogen can be substantially reduced.

An AISI 1018 steel plate 6 in. thick was selected with a hydrogen content of 5.5 ppm to investigate the effect of heat treating times and temperature upon the hydrogen content. (Most published data on diffusion are based on thin sections of pure iron or specially prepared material which does not represent large masses of commercial grades.) The plate was cut into sixteen 15-in. square blocks for this investigation.

Results — Each block was core sampled and analyzed for hydrogen prior to heat treatment. Duplicate core samples were taken from each block following heat treatment to determine the effectiveness of the various treatments. As with the samples which were not, a sinusoidal distribution of hydrogen with a maximum concentration at the center was found in all.

The damaging effects of hydrogen in steel on coated metal sur-



influenced by the presence of other elements such as phosphorus. The effects are not entirely detrimental: Nitrogen is most potent in increasing the strength of steel. Case hardening by nitriding, for example, is a useful process.

Many of the statements made for oxygen also apply to nitrogen in nonferrous metals since, in general, the solubilities of oxygen and nitrogen are similar for the same metal. However, nitrogen is easier to control, since its principal source is air, while oxygen is also present in moisture or as a component of slags and refractories.

Hydrogen—Without a doubt, the control of hydrogen content is the most important gas-metal problem in the steel industry today. Though acid-slag melting causes less hydrogen trouble than the basic-slag methods, no common melting practice produces hydrogen-free metal.

The slow progress in eliminating hydrogen problems may be attributed to the anomalous behavior of this gas. It is always present in steel and yet fugitive. Until recently, few hydrogen analyses were based on proper sampling. Much time and effort devoted to the analysis of good, bad and indifferent heats yielded almost identical results of one or two parts per million. Hydrogen did its damage and diffused from the steel so that, at the time of analysis, all samples had reached a common level. It is now recognized that samples for hydrogen determination must be taken before diffusion losses occur. Such samples may be stabilized by storage at dry-ice or liquid-nitrogen temperatures until analyzed.

Dirty Work—High hydrogen content accentuates or causes four important defects in ferrous metals: 1. Porosity in steel during solidification of ingots or castings. 2. Flakes and shatter cracks, which sometimes form when heavy-section ferritic steels are being cooled to atmospheric temperatures. 3. Loss of ductility, even in sound steel, during plastic deformation. 4. Delayed brittle fractures in high-strength steels subjected to comparatively low stresses.

Delayed brittle fractures have caused the aircraft industry much concern. Some steels have broken with a brittle fracture when stressed below their yield strength for a sufficiently long time. It is generally believed that embrittlement of this type results from hydrogen introduced to the steel during electroplating with coatings such as cadmium.

Bearings—Blistering of coatings on ferrous alloys is another interesting, although unusual, defect caused by hydrogen. It can diffuse to regions of lower hydrogen concentrations at reasonable rates but diffuses slowly or not at all in materials such as tin or babbitt. These differences in diffusion rates can cause trouble in parts such as steel bearings covered with babbitt.

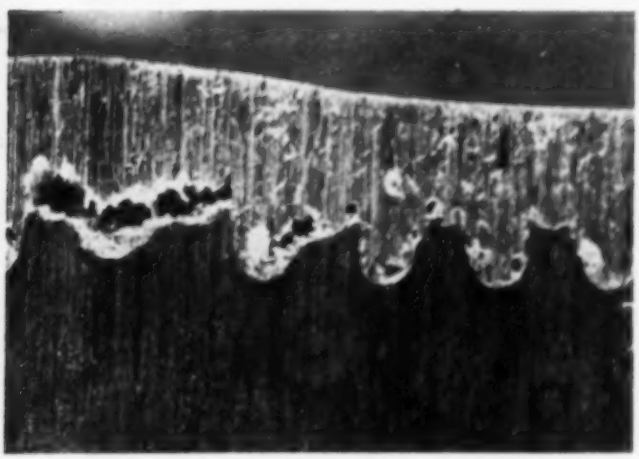
As hydrogen diffuses to the surface, it deposits in voids at the interface between the metals. As it continues to deposit, high gas pressures develop and push up the babbitt to form blisters or even tear it loose. This situation is aggravated under operating conditions because heat generated in the bearing raises the temperature of the steel and increases the diffusion rate.

Nonferrous — Hydrogen is also the principal cause of gas problems in nonferrous materials. Porosity in castings of copper, nickel, magnesium and aluminum are all related to hydrogen.

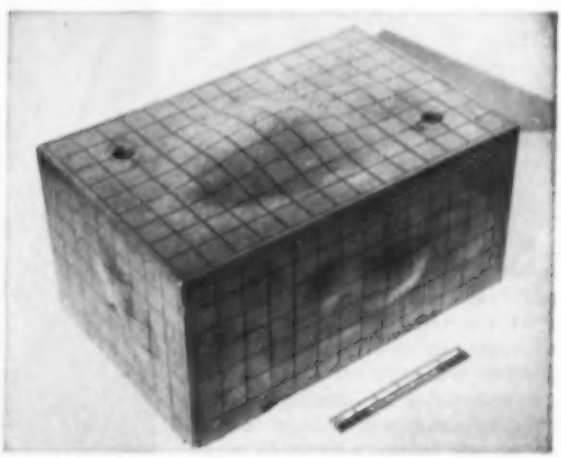
Probably the most urgent hydrogen problem today is embrittlement of titanium sheet, fasteners and engine parts for aircraft. Maximum specifications of 150 parts per million hydrogen in sheet and

faces can plainly be seen by the diffusion experiments. The blistering of the babbitt on a block heated at 250°F for 165 days is analogous to the blistering of enameled sheet metal. However, the 7-in. thick section contains many times the volume of hydrogen contained in a thin sheet of steel.

Mechanism—The blistered areas formed on the various blocks after 233 days at 250°F clearly illustrate the elusiveness of hydrogen. The diffusing gas does not appear to follow any preferred path. These



Section through hydrogen blister on a babbitted block



Babbitted steel block showing hydrogen blisters

Gases in Metals

125 ppm in forgings and bar are being met in only about 90 per cent of titanium supplied today.

Zirconium suffers loss of ductility from precipitated hydrides in a manner similar to titanium. Unless this problem is solved, it may limit some uses of this metal.

Progress—An optimistic view is justified by the existence of analytical methods to help solve most gas-metal problems. Modification of these methods for application to other metals or alloys should be no great chore. The diffusion rates and solubilities of gases in many metals are known. The rates and mechanisms of reaction of gases with metals are less completely known but progress is being made.

Light metals are frequently degassed by flushing a stream of inert or insoluble gas through the melts. Many producers of special steel alloys and metals which are highly reactive with air are melting them in vacuum furnaces. Gases present in starting materials are removed and the pickup of atmospheric gases is eliminated. In other cases, metals melted under slag in air are being degassed by pouring them into evacuated mold chambers.

Degassing — Mechanical, magnetic and ultrasonic methods of vibrating molten metal show promise for degassing. Centrifugal casting partly owes its success in producing dense castings to the incidental vibration and agitation of the metal.

Where possible, metals should be degassed in the molten state where diffusion rates are extremely fast and diffusion paths for gases can be reduced effectively by stirring the melt.

The most feasible means of removing gases from solid metal appears to be heating in vacuum. In the case of thick castings, the degassing time can be amazingly long.

We have come a long way in our understanding of gas-metal problems. In fact, we have almost completed the circle. Some of the earliest studies were of the gas content of meteorites and its relation to the composition of the upper atmosphere and interplanetary space. Our next concern, no doubt, will be with the effects of these environments on the structural metals of space stations and interplanetary rockets.

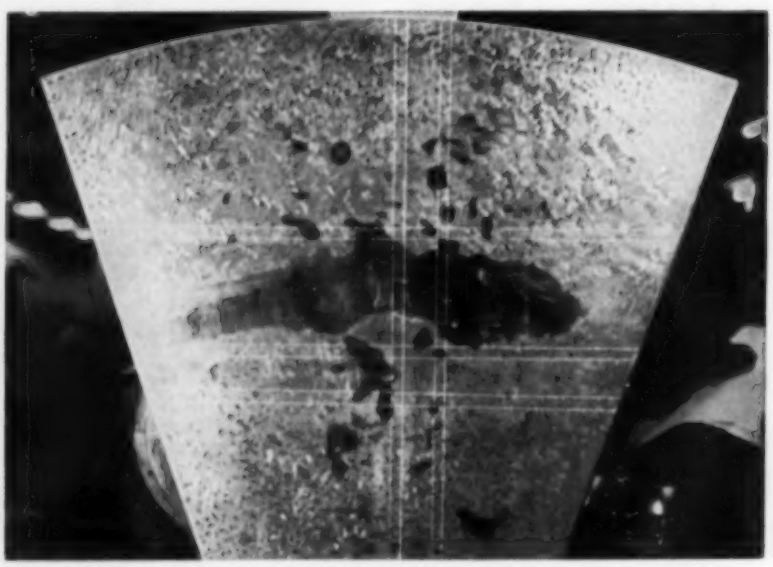
Blisters in Babbitt

facts were seen by comparing the differences in blister area on blocks cut from the same heat treated section.

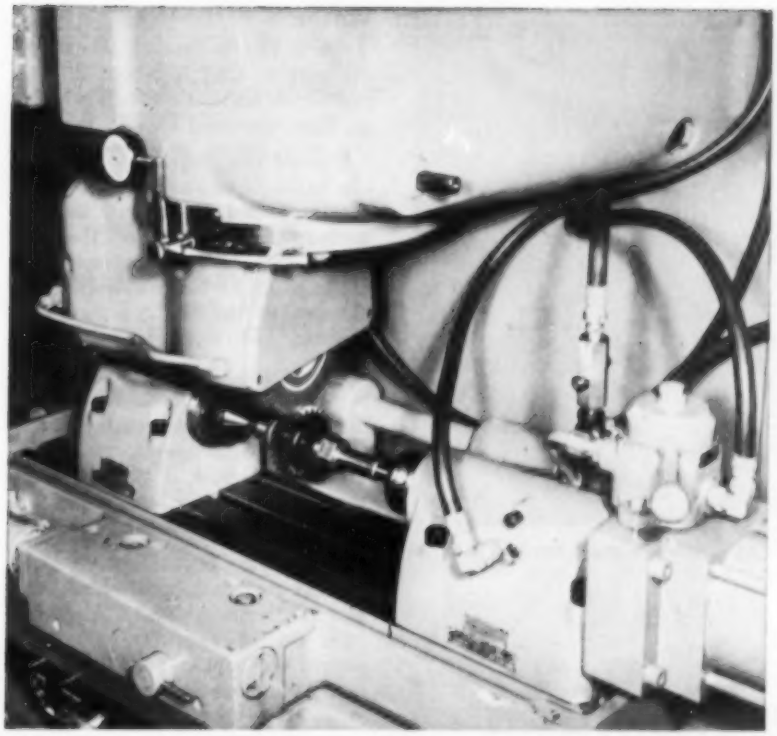
This variation can be theorized in several ways: 1. The babbitt itself may have permitted the hydrogen to escape. 2. The babbitt may have had greater strength and resistance to creep; consequently, the pressure under these blisters would have been greater. 3. The hydrogen may have diffused through the unbabbitted bottom surface. 4. Greater amounts of segregation and fissures in certain blocks may have afforded an easier path for the hydrogen to escape prior to babbitting.

Conclusions — Since the babbitt to steel bond did not rupture in two of the six blocks containing 1.5 ppm and blister growth had stopped on other sections containing 1.4 ppm (as determined by analysis after the tests), the solubility of hydrogen at 250°F in this steel must be near this value. A hydrogen content of 1.1 ppm appears to be a reasonable one below which no breaks in the babbitt to steel bond should occur because of diffusing hydrogen. However, should a preferential path such as a crack exist, lesser amounts of hydrogen may cause the bond to rupture.

The rate of hydrogen elimination is largely affected by temperature and thickness. The time required to reduce the 6-in. thick plate containing 5.5 ppm of hydrogen to a value of 1.1 ppm was only 1.5 days at 1100°F, but it would require approximately 4.5 days at 850°F and approximately ten days at 575°F. Room temperature storage would require considerably longer.



Wiping of babbitt on a bearing pad caused by hydrogen blisters



Helical gears for automotive transmissions are honed under zero backlash to clean up nicks and burrs and to correct for heat treat distortion. Gears make one pass back and forth across the tool face

Honing tools are compression molded to close tolerances. Silicon carbide abrasive particles, 40 to 80 grit, are suspended in a plastic matrix

Gears Honed to a Whisper

Objectionable noise may occur even in the highest quality gear trains. Now, honing of the teeth themselves bids fair to be an effective silencer of gear noise

YOU can trace gear noise to things like nicks and burrs, distortion caused by heat treatment or an improper surface finish.

Gear tooth honing could be the answer to the problem, submits National Broach & Machine Co., Detroit.

How—A tool which resembles a cross between a gear and a grinding wheel is the key to the new technique. A throwaway, it is a silicon carbide abrasive suspended in a specially compounded plastic matrix. National Broach developed the gear honing wheel.

Cycle — Shaped like a helical gear, the tool is run in mesh with the hardened gear at high speeds. Axes of the gear and tool are slightly crossed.

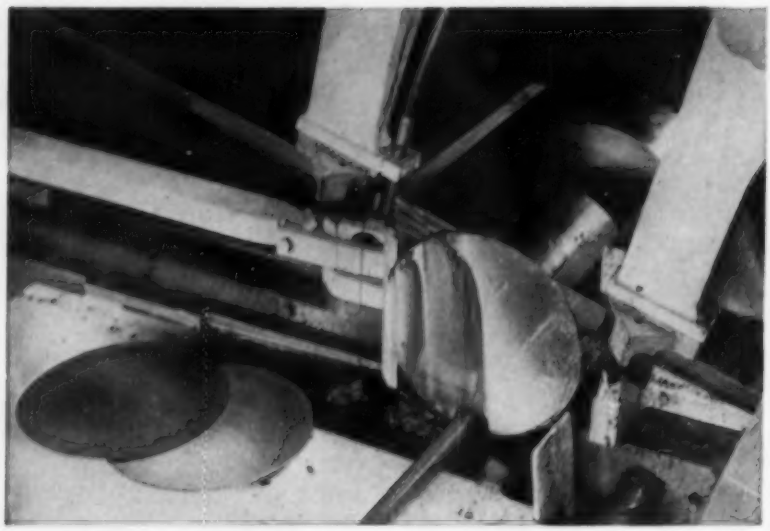
The gear, which traverses the tool in a path parallel to its axis, is driven by the tool. During the cycle, the gear is rotated in both directions.

Machines—Two initial models of these Red Ring honing machines are available for production. One is designed to improve sound characteristics of gears by removing nicks and burrs, making minor tooth corrections and improving surface finish. Gears are honed under low-backlash conditions with optional brake loading.

The other model is designed for more extensive tooth correction. It uses a patented, zero backlash, self-adjusting table. The head and tailstock drop away from the tool for loading and unloading. After the workpart is loaded in mesh with the tool, the table tilts up, bringing the gear and tool into zero backlash.

Plusses—Removal of nicks and burrs will generally be the big job. However, since the honing action tends to generate an accurate tooth form, small corrections are made in both form and lead which will considerably improve the sound characteristics of a hardened gear.

High quality surface finishes can be obtained by using the process on shaved gears.



Rule No. 1: Rigidity. Guides are as tight as possible without binding, support arms in close. Discs are 0.030 in. thick

How To Saw Titanium

The same properties that make this modern metal useful at high temperatures and stresses interfere with its machinability. Here is what one machine builder recommends

IN spite of its extreme toughness you can saw titanium.

Here is the way the DoAll Co., Des Plaines, Ill., says it should be done: Use coarse (3-6) pitch, high-speed blades, sulphurized cutting oil and a blade speed of 40 to 80 ft a minute.

You'll need a big, heavy-duty machine; underpowered ones won't give consistent results.

Adjustments—When you're cutting a difficult metal like titanium, the adjustments of the band sawing machine become critical. Band tension should be up to snuff, and the feed pressure controlled and firm to insure tooth penetration.

During cutting you can prevent any lead by carefully adjusting the guides for a snug fit with no binding.

Friction — Conventional sawing speeds will give you a better finish without disturbing the metallurgy of the metal. If you don't need a high finish, try friction sawing. Velocities (3000-5000 fpm) are lower than those used for steel. Plates an inch thick are about the upper limit.

Blades—Except for friction sawing, carbon steel blades aren't satisfactory for sawing titanium. High speed steel blades are a must.

Blade life is longest if cutting pressure is held to about 2.75 lb per tooth until the blade is worn in, then increased to 4.75 lb.

Coolant — Heavily sulphurized oils seem to be the best of all the coolants tried. Chips, if allowed to weld to the face of the saw tooth, can cause interference in cutting. A forceful flow of coolant against the kerf is a good preventive.

Deviations—In its present commercial state, you will find titanium an inconsistent metal. Expect to make adjustments from one piece to another. Cutting rates that work well on one heat may be quite difficult on the next.

"To get the best blade life, quality and straightness of cuts," says M. A. Bergson, DaAll engineer, "the cutting rate (for No. 140) should not exceed 1 sq in. a minute. Cutting in excess of that speed may cause leading, and damage saw set."

Automatic hydraulic feeds are an improvement which prolong tool life and the accuracy of cuts.

Metal producers are turning to the band saw as a practical and economical way to cut titanium, even though cutting rates are low compared to those of less tough metals and alloys.

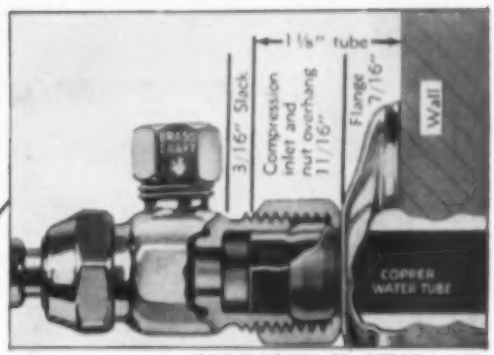
• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.

Sawing Data for Four Types of Titanium

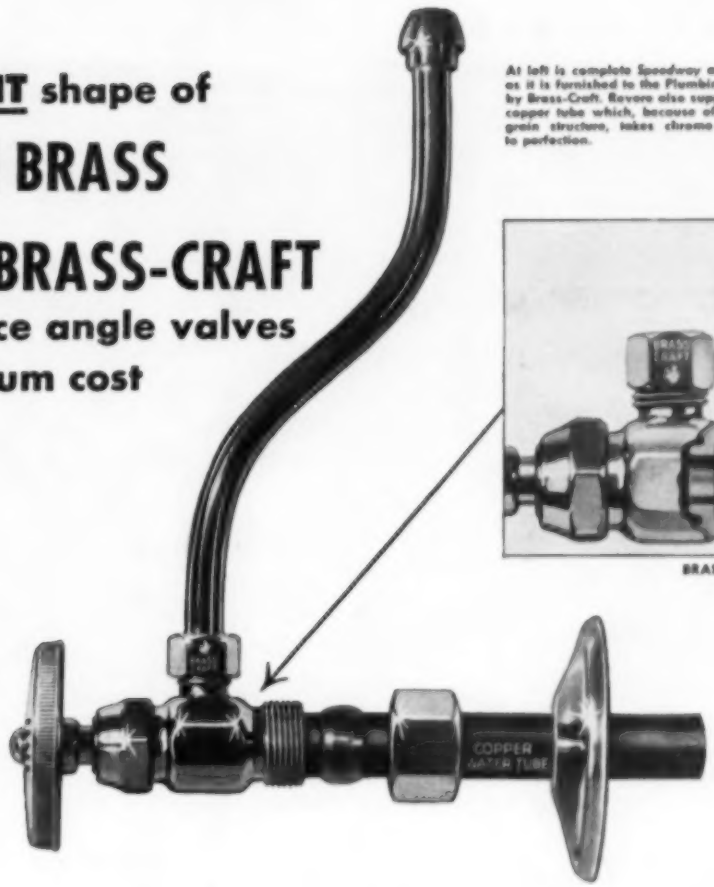
Type	RC-130-B	#140-A	Commercially Pure	#150-A
Saw Set	0.058 in.	0.058 in.	0.061 raker	0.061 raker
Pitch (teeth/in.)	6	6	6	14
Width	1 in.	1 in.	1 in.	1 in.
Velocity (fpm)	90	80	80	40
Lubricant	Cutting oil	Cutting oil	Cutting oil	Cutting oil
Initial Feed Pressure (lb per tooth)	2.75	1.5	2.75	2.75
Cutting rate (sq in./min.)	0.50	0.88	0.589	0.06
Finish microinches (rms)	125	175	200	——

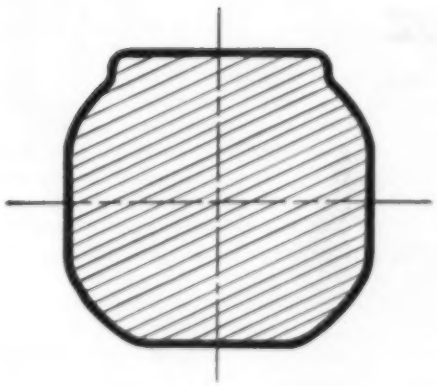
The **RIGHT** shape of
REVERE BRASS
enables BRASS-CRAFT
to produce angle valves at minimum cost

At left is complete Speedway assembly as it is furnished to the Plumbing Trade by Brass-Craft. Revere also supplies the copper tube which, because of its fine grain structure, takes chrome plating to perfection.



BRASS-CRAFT MFG. CO., DETROIT 1, MICH.





Cross section of Revere Brass Shape used in fabricating angle valves. Corners are rounded for easy buffing, leaving sufficient surface area for wrench pad. Top is made flat for speedy insertion of outlet.

Brass-Craft Manufacturing Company, manufacturers of Speedway Supplies, Valves & Fittings, considered two factors in selecting the Brass Shape of its angle valves.

1. Fabrication from the standpoint of production.
2. Installation and performance of the valve in use.

The shape at the left was found to be "*right*" from a production standpoint. Brass-Craft preferred it because it was nearest to the finished shape, saving metal, as well as extra cutting and machining. The fine grain structure of Revere Brass makes it especially easy to cut, drill, thread, buff and plate. Its "*right*" shape permits fabricating the valves into assemblies which save installation time. In this way, Brass-Craft is able to produce a high-quality product at minimum cost.

In addition, these brass valves resist corrosion and are compatible with copper water tube. Thus they have ready acceptance with plumbing and building contractors, as well as home owners.

Once again it is proved that there is one "*right*" product for every application. A Revere T. A. (Technical Advisor) is available to help you get the one best for you. He is always ready to cooperate in seeking ways to save money and improve your product. Call or write today.

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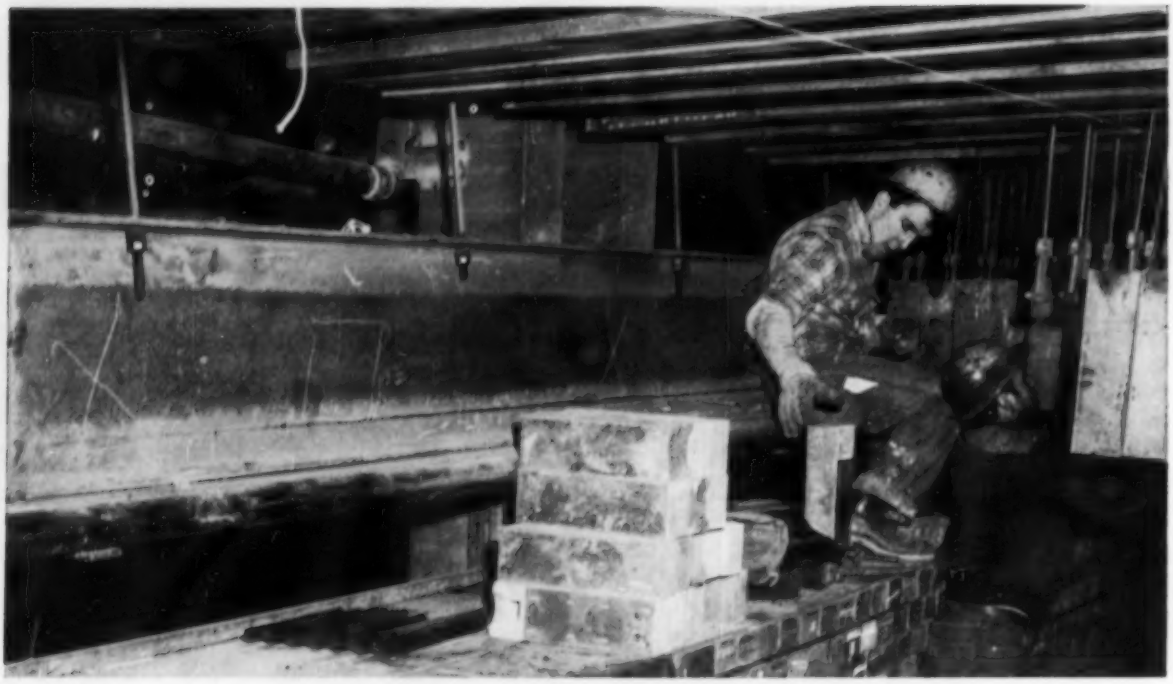


An open hearth furnace at Inland Steel Co., Chicago, gets a flat suspended, all-basic roof. It will be watched carefully for evidence that its life is longer than that of other roof designs

No Rest for Steelmaking

Enthusiastic steelmen thronged the Iron & Steel Show with eyes open for ways to keep up with the speeding economy. Here's a sample of what they heard

THE FUTURE was a big drawing card, but in Cleveland's Public Auditorium week before last you could strike up a conversation as quickly on the here and now. In exhibit booths and technical sessions at the AISE Convention (Sept. 25-28), the talk ran heavily to greater productivity with present facilities.

William O. Bishop, superintendent of Plant 2 blast furnaces, and Charles P. Frame, mechanical foreman, Inland Steel Co., East Chicago, Ind., drove the point home with a paper on "Reducing Delays During the Blast Furnace Campaign Through Improvement of Mechanical Features." Traditionally, the major reason for concluding a blast furnace campaign has been lining failure. Now linings are outwearing mechanical features of the furnace.

Wear Points—Skip bridge rails, sheave wheels, bleeder valves, hopper wearing plates, bells and bell seats, downcomers, bosh plate pipe nipples and bell pull and counterweight cables are features that Inland has found need beefing up to keep pace with furnace linings.

The authors suggest designing in longer life through greater metal thickness (bell parts) and corrosion resistant materials such as stainless (bosh plate pipe nipples). The added initial expense is more than written off in reduced down time.

Another suggestion: Sectionalize cables with splice assemblies so that short lengths subject to wear (such as parts that pass over sheaves) can be replaced. It's much faster than replacing the entire cable.

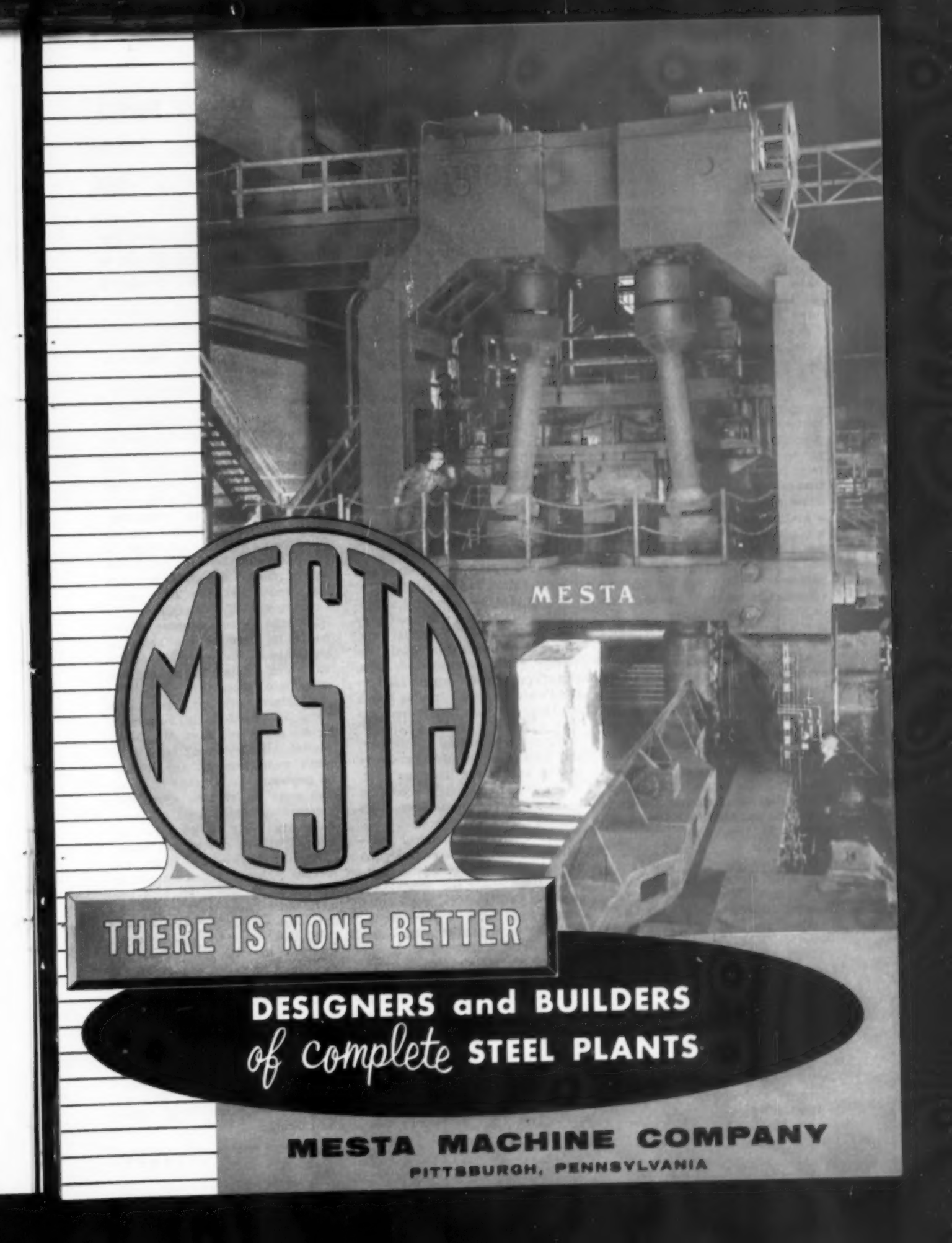
Open Hearth—A comprehensive survey, "The All-Basic Open Hearth Furnace," by R. P. Heuer, vice president, and M. A. Fay, assistant general sales manager, General Refractories Co., Philadelphia, concluded in much the same vein: The basic open hearth can realize considerable gains in productivity through improved operating practice and design.

The authors listed these areas for immediate improvement:

1. Increased fuel input maintained throughout the melting period.
2. Furnace chamber and port designs which promote rapid combustion and high - temperature flame.
3. Combustion control for hotter flames.
4. Oxygen for combustion and decarburization.
5. Higher air preheat temperature.
6. Increased furnace hearth area and heat size.

Put them all together in one

(*Please turn to page* 104)


MESTA
MESTA
THERE IS NONE BETTER
DESIGNERS and BUILDERS
of complete STEEL PLANTS
MESTA MACHINE COMPANY
PITTSBURGH, PENNSYLVANIA

furnace, suggested the authors, and 6-hour heats with good refractory life appear possible.

Oxygen—Rapid growth of oxygen as a tool for increasing steel production has focused interest on the costs involved. Arthur E. Steele, assistant to the general sales manager, and Donald E. Cummings, manager, Steel Mill Sales Division, Air Products Inc., Allentown, Pa., provided cost figures in a timely report on the "Economics of Oxygen Generating Stations for Steel Mill High and Low Purity Oxygen Applications."

Some of the variables that enter the cost picture are capacity of oxygen plant, type of use (intermittent or continuous) and relative percentage of low and high purity oxygen required. Costs can range from $26 a ton for a plant with 7 tons of capacity per day which produces only high purity oxygen on a continuous basis to $5 a ton for a plant with 800 tons of capacity per day which produces both low and high purity oxygen in a 90-10 per cent ratio. Costs for the latter break down to 33 per cent for capital charges, 55 per cent for power and the balance for cooling water, maintenance and labor.

Atomic Energy—Among papers concerned with the economics and technology of the present, one stood out like a neon sign to the future: The report by R. B. Peterson, director, nuclear research, Republic Steel Corp., Cleveland, on "Nuclear Technology and the Steel Industry." He suggested a number of potential uses for nuclear energy in steelmaking that look promising enough to require investigation. Some of his suggestions:

Reactor-produced heat could substitute for stove heating by blast furnace gas. It could be used for roasting nonmagnetic ore for beneficiation prior to shipment, and for preparation of sponge iron.

Reactor-developed technology for the use of liquid metals, salts and organic materials in heat exchange loops could be applied directly to cooling of furnace walls, grates, doors, continuous casting molds.

Neutron sources could be used for quick chemical analysis. Radioactive tracers could be used to determine the rate of movement in the blast furnace stack.

Prolong Machine Life

Here are tips on what a builder thinks is important for long machine life. A simple color-coded lube system is part of the system; so are routing machine physicals

"PREVENTIVE maintenance is your best insurance against those new machine tools becoming clunkers," in the opinion of F. E. Manchester, superintendent, Central Services Division, Brown & Sharpe Mfg. Co., Providence, R. I. "When the cost of a machine is amortized to a small percentage, you will still be getting a large percentage of original accuracy and performance."

If anybody should know about the care and feeding of machine tools, a machine tool builder should. A carefully conceived program at B&S shows what this builder thinks is important.

Early Start—Preventive maintenance begins on a machine before it's purchased. "If similar machines have been purchased previously," Mr. Manchester says, "any problems of proper lubrication, wear areas and trouble points are checked to see if improvements have been made on later models."

When the machine is received and set up in the plant, properly leveled and power lines installed, it is serviced completely according to the manufacturer's instruction manual.

Code Circles—To simplify lubrication, a color has been assigned to each of the six standard lubricants used. At the lubrication point on the machine, a circle of the correct color is painted on. With the lubricants in color-coded dispensers and containers, there's no need for maintenance men to refer to charts. When noncoded lubricants are required, aluminum tags specify type.

Dust Caps — Yellow neoprene caps snap over grease gun fittings. They keep out dust and chips and call attention to the fittings so they're not missed.

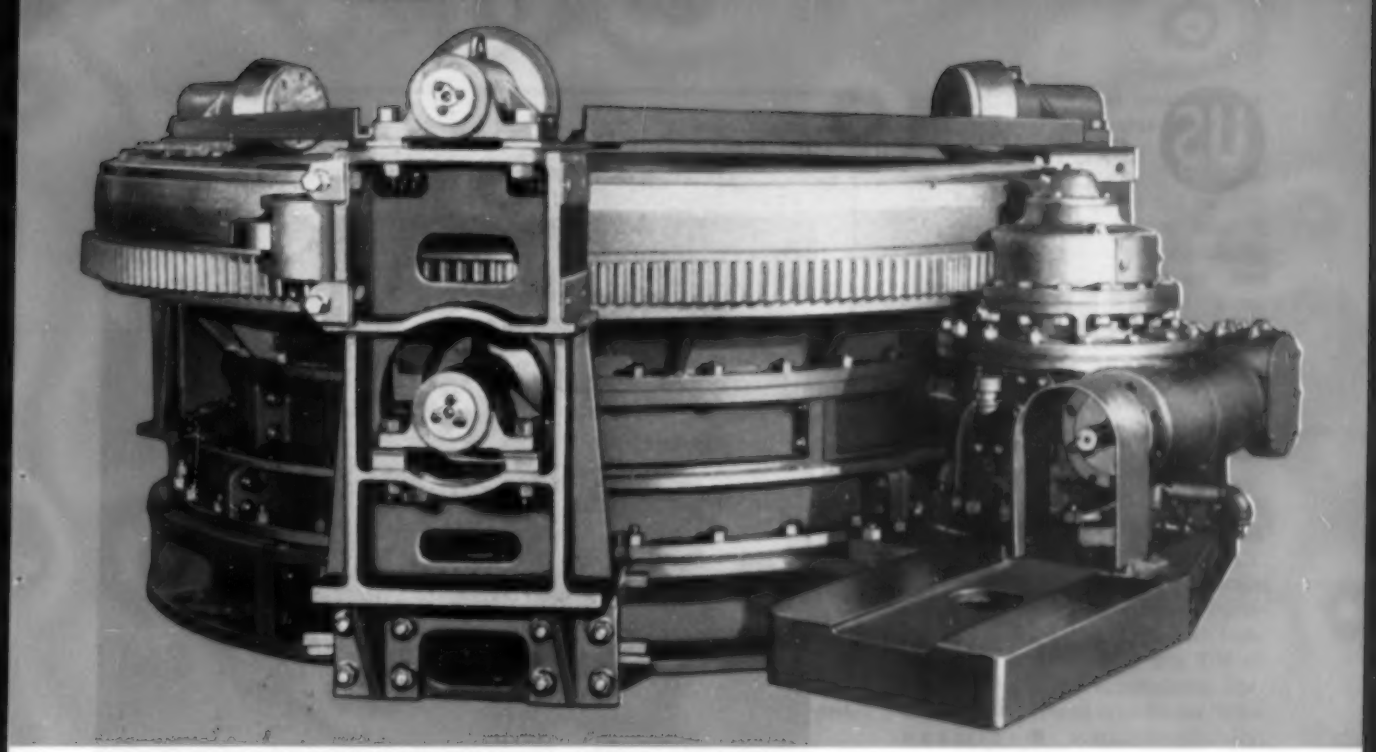
A touring truck services hydraulic systems. It carries two tanks, pumps, piping and control valves. The truck can remove the oil and replace it with new, or it can refilter the oil and return it to the machine. Normally, Mr. Manchester says, machine servicing consists of a semiannual refiltering rather than an annual oil change. Filters are inspected and changed only when necessary. Oil changing or filtering has been extended to those machines with headstock or apron reservoirs. They are drained, flushed and refilled twice a year. All filters in the line (and those on the intake side of pumps) are given clean felt replacements at the same time.

Alignment—Maintenance men at B&S make periodic machine adjustments to preserve the accuracy built into a machine. One of the important points: Is the machine still leveled properly?

Machines with long beds and ways are particularly vulnerable to misalignment, says Mr. Manchester. If they aren't level, they won't wear properly, and it may be necessary to rescrape or grind the ways to restore alignment. Inaccuracies which build up gradually are likely to go unnoticed unless periodic checks are made.

Routine Physical — Every six months each production machine is inspected. A check list tells the maintenance man what to investigate. He makes the necessary repairs, and, when the check list is returned to the front office, it becomes a record of the machine's condition.

Mr. Manchester warns that it often is necessary to replace some parts before they're completely worn out to keep down time at a minimum. This means, he says, that you must maintain an adequate inventory of normal replacement items such as belts, filters and bearings.



New model McKee Heavy-Duty Distributor* ready for installation of revolving hopper.

NOW... a new McKee Distributor with Heavy-Duty features

for smaller Blast Furnaces

FOR fifty years the McKee Distributor has been virtually standard equipment throughout the industry. With the advent of modern, large-hearth-diameter furnaces McKee designed the large Heavy-Duty Distributor which has proved so successful on the newer furnaces. This year McKee produced a new intermediate model incorporating the best features of the large heavy-duty model in a distributor recommended for "high-pressure operation" on smaller, existing furnaces. Five of the new units are already in operation and three others are now being installed. Both Heavy-Duty models are also available with a special seal for high-speed operation without appreciable increase in horsepower requirements.

Heavy-Duty design assures you lower maintenance . . . improved, uninterrupted performance

TRIPLE, GREASE-LABYRINTH GAS SEAL with improved, resilient packing in contact with a smooth, hard-chrome-plated surface. Experience with this same seal on the large McKee Heavy-Duty Distributor indicates that not more than one packing change is required during the campaign of a blast furnace.

RUGGED, MANGANESE-STEEL BELL SEAT is easily accessible by removing the revolving hopper only, without disturbing ring gear, rollers or seal.

THREE ROLLER STANDS support top, bottom and side rollers in a compact design which provides maximum accessibility for inspection and maintenance.

WEAR IS REDUCED by distributing loads over wider ring gear and pinion faces, larger roller and roller track insert surfaces.

ROLLER BEARINGS of liberal size in top, bottom and side rollers, bell rod support and drive unit are sealed against dirt.

AMPLE SAFETY MARGIN is provided by heavy construction, with every part designed to withstand far more than maximum expected load.

*PAT. PEND.

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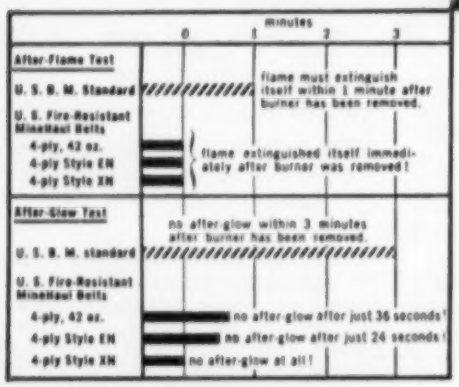
MEETS and EXCEEDS all existing fire-resistance regulations

Comparison of U.S. Fire-Resistant MineHaul Belts with standards as set forth in United States Bureau of Mines Schedule 28*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flame must extinguish itself within 1 minute after burner has been removed.
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flame extinguished itself immediately after burner was removed!
After-Glow Test
no after-glow within 3 minutes after burner has been removed.
U. S. B. M. standard
U. S. Fire-Resistant MineHaul Belts
4-ply, 42 oz.
no after-glow after just 36 seconds!
4-ply Style EN
no after-glow after just 24 seconds!
4-ply Style XN
no after-glow at all!

*as tested in United States Rubber Company laboratories in accordance with Bureau of Mines test specifications.

Testing these belts in U. S. Rubber's own laboratory—*in accordance with Bureau of Mines specifications*—it was found that U. S. Fire-Resistant MineHaul Belts not only meet but EXCEED all existing fire-resistance standards (see chart to left).

These new belts have been given the Bureau of Mines acceptance designation: "Fire-Resistant, U.S.B.M. No. 28-S."

U. S. Fire-Resistant MineHaul Belts combine maximum fire safety with all the qualities you've come to expect in a "U.S." belt: optimum troughability, high impact resistance, outstanding rip resistance, excellent fastener-holding ability, added edge protection, mildew resistance—to name a few.

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Effect of titanium, boron on hot strength of stainless . . .

Mechanical properties of leaded steels . . .

New process for making nodular iron . . .

Tensile values of metals at low temperatures . . .

What's New in Metals

Those attending the National Metal Congress in Cleveland this week will hear these subjects discussed in technical sessions. Here is a cross section of ASM papers

Superalloys

High Temperature Rupture-Strength Properties of Chromium-Nickel Stainless Steels Containing Titanium and Boron—High temperature alloy producers and jet engine manufacturers would like to use leaner alloys than are currently specified for aircraft construction. Modified compositions of the chromium-nickel stainless steels offer possibilities.

Types 302 and 316 stainless steels, altered by titanium and boron additions, were evaluated for their 100-hour rupture life at 1500°F. Compositions were prepared as 15-lb heats and rolled to about 0.050 in. sheet for stress-rupture testing.

A number of these compositions showed significant improvements in hot strength. While the nominal 100-hour rupture strength at 1500°F is in the 5000 to 9000 psi range for the conventional chromium-nickel stainless steels, values of 18,000 to 20,000 psi were obtained for several of the titanium and boron modifications of these alloys. A number of the alloys showed similar gains at 1350°F.

The tests showed that titanium, boron and carbon can improve the 100-hour 1500°F rupture strength of 18 Cr - 8 Ni and 17 Cr - 12 Ni - 2.5 Mo stainless steels heat treated in the range of 2100 to 2300°F. Rupture ductility remains good and in most cases is improved over the values obtained for base compositions solution treated at these temperatures.

In general, maximum high temperature strengths, for the range of compositions studied, increased as carbon levels were raised, with the largest strength increment occurring between 0.07 and 0.15 per cent carbon. Rupture ductility was relatively unaffected, particularly for alloys containing combined titanium and boron additions.

High temperature strength of the modified type 316 stainless steels is superior to the modified type 302 steels under similar conditions of heat treatment and at similar titanium, boron and carbon levels.

When titanium and boron are added jointly to 18 Cr - 8 Ni and 17 Cr - 12 Ni - 2.5 Mo stainless steels, peak 100-hour rupture-stress values occur at lower titanium contents as boron increases.

Maximum rupture strengths of stainless steels containing titanium and boron as single additions and also in combination were greatly improved, in most cases, by using higher heat treating temperatures. These gains were generally accompanied by a decrease in rupture ductility. This decrease in ductility was not as pronounced for the boron bearing steels as for the steels containing only titanium.—J. Salvagi and L. A. Yerkovich, Cornell Aeronautical Laboratory Inc., Buffalo

Effect of Environment on Creep-Rupture Properties of Some Commercial Alloys—The effect of air, oxygen, nitrogen, helium and vacuum on creep and rupture properties was investigated for these alloys: DM-45, 12 per cent Cr-V steel, AISI 304, N-155, S-816, Inconel X.

Creep-rupture tests were made on unnotched and notched specimens for up to 500 hours at temperatures from 1100°F for DM-45 to 1500°F for the superalloys. Sections of fractured specimens were examined metallographically, checked for variations in hardness, and analyzed for gas contents.

Results showed the rupture life and minimum creep rate of all the alloys were influenced by environment; certain effects were generally common to all.

Rupture life was longer in an air atmosphere than in oxygen, nitrogen, helium or vacuum. In general, the oxidizing atmospheres resulted in longer rupture lives than the inert atmospheres.

Minimum creep rate was generally the lowest in air; there was no consistent effect produced by the other atmospheres.

The presence of a notch in the alloys of relatively low ductility, S-816 and Inconel X, greatly increased the susceptibility of the materials to the influence of environment.

The notch sensitivity of a material may be affected by environment. Inconel X, at 1500°F and 25,000 psi, was notch strengthened in air and oxygen atmospheres, but was notch weakened in nitrogen and vacuum.—Paul Shahinian, Naval Research Laboratory, Washington

Stainless Steels

Martensitic Transformation in the Machining of Austenitic Stainless Steel—Many studies of austenitic stainless have been concerned with

the generation of the low carbon martensite or ferrite in various plastic-working processes and under different conditions of testing. The transformation which occurs in machining has received much less attention.

The material may be a troublesome one in the machine shop, and at least part of this behavior is attributed to the strength-producing transformation. As cutting progresses, appreciable hardening may occur below the new surface because of a high and persistent rate of work hardening frequently coupled with the formation of martensite by machining stresses.

Another problem involving the stress-induced transformation of austenite could arise in connection with the machining, especially grinding, of heat treated carbon and alloy steels containing retained austenite. The volume increase accompanying transformation might produce localized patterns of stress sufficiently intense to bring about cracking.

An earlier electron-diffraction study of the transformation induced in an 18-8 austenitic steel by various surface finishing processes demonstrated that transformation had occurred and that temperature and stress were important variables controlling the depth and extent of transformation.

In the present work, a high-angle Norelco x-ray spectrometer was used to establish the amount of martensite formed in two common machining operations: Single-point cutting by planing, and grinding. Analyses were made following simple procedures developed earlier for quantitative determinations of retained austenite in hardened steels.

In planing, the depth to which the stress-induced transformation penetrates is only a fraction of the depth of cut; for type 301 planed at −108°F with a 15 degree rake-angle tool (shear strain of 2.47), the transformed zone extended downward about 0.002 in. or nearly one-third the depth of cut of 0.007 in.

The maximum amount of transformation occurred at the surface, where, for all shear strains produced in chip formation, it was greater in type 301, with its higher M_s and M_d temperatures, and increased as the temperature was lowered from 68 to −108°F. For both steels and temperatures, shear stresses increased with shear strain, while the quantity of martensite at the planed surface decreased.

This has been attributed to the increasing strain rate and greater temperature rise that accompanied chip formation at higher shear strains. Both shear stress and the energy of cutting corresponding to any shear strain increased as the martensite content at the planed surface increased.

The zone transformed in grinding extended to a much greater proportionate depth; in type 301 at 68 and −108°F, it penetrated to about 0.003 in., or six times the depth of cut of 0.0005 in. Maximum transformation occurred beneath, rather than at the surface. This has been explained as the result of simultaneous effects of stress and temperature, both being much higher in grinding than in planing.

Tests on type 301 at −108 and −320°F showed that the amount of martensite at the surface was even less than in the interior well below the zone affected by grinding.

High surface temperatures, comparable to, but still different from those of the previous austenitizing heat treatment, plus different rates of temperature change, are held responsible for that observation. Grinding energy increased rapidly with decreasing temperature, more rapidly for type 301 with its more extensively transformed surface at all temperatures.—E. F. Erbin, Titanium Metals Corp. of America, New York; E. R. Marshall, University of Vermont, Burlington, Vt.; and W. A. Backofen, Massachusetts Institute of Technology, Cambridge, Mass.

Leaded Steels

Impact Characteristics and Mechanical Properties of Leaded and Nonleaded C-1050 and C-1141 Steels—Today, lead is being added to an ever increasing number of steels to improve machinability. Originally, leaded steels were made almost exclusively in the low carbon, re-sulphurized grade of free machining screw stock to enhance its machinability.

It is now accepted that lead may be added to any grade of steel destined for machining applications. The aimed lead addition is 0.20 to 0.30 per cent. Although the condition or form in which the lead is present has never been definitely established, it is believed to be in a submicroscopically divided phase, but it is not known whether it is present as metallic lead or as a sulphide.

The effects of lead on the physical properties and Charpy impact characteristics have been the topics of many discussions and a number of investigations and technical papers. This paper deals with experiments set up to determine what differences, if any, exist between the Charpy impact characteristics of leaded and nonleaded steels of higher carbon contents.

Conclusions drawn from the studies show no significant differences in Brinell hardness and tensile properties between the leaded and nonleaded materials.

The addition of lead gives a somewhat smaller grain size than that of the base steel (to which the lead was added). Both the ferritic and the austenitic grain sizes are influenced.

Charpy impact transition temperatures in seven out of eight instances average 22°F lower on leaded tests than on the corresponding nonleaded grades.—A. P. Weaver, Inland Steel Co., East Chicago, Ind.

Low Temperature Properties

Some Exploratory Observations of the Tensile Properties of Metals at Very Low Temperatures—The tensile properties of several metals of various lattice structures have been determined over a wide range of subzero and moderately elevated temperatures.

The metals with a b.c.c. lattice structure were the only ones to show a strong dependence of yield strength upon temperature. However, the yield strength of these metals did not increase as rapidly at the lower temperatures as predicted by current theories. Quenched and tempered steels and

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Boeing Airplane Co., Wichita . . .
has played an important role in pioneering the great advance of optical tooling. Shown here is a typical Brunson Optical Tooling set-up used for erecting major assembly jigs. Officials report: (1) Accurate basic reference lines can be established in much less time (2) Set-up times are sharply reduced (3) Multiple crew loadings are possible (4) Need for many master tools is eliminated and simplification of gages made possible. Boeing estimates that Optical Tooling has saved more than a quarter-million dollars on second source B-52 tooling.

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beta-brass exhibited considerable plastic deformation in tests at 4.2 K.

In contrast with these metals, the f.c.c. metal, nickel, and the c.p.h. metal, zirconium, showed only a slight dependence of yield strength upon temperature. This lack of dependence was considerably more pronounced than it was in the b.c.c. metals; the yield strength remained essentially constant below 123 K.

The quenched and tempered alloy steels did not show the usual large percentage increase of yield strength with decreased test temperature which is characteristic of b.c.c. metals. A yield strength increase of about only 1½ times was noted in the range from room temperature to 4.2 K.

It is felt that this behavior can be attributed to an initial high room temperature yield strength resulting from the carbide particle size, shape and distribution. A relationship is proposed which provides a simple method of approximating the temperature dependence of the yield strength of alloy steels.

The work hardening characteristics of the various materials as related to test temperature may be divided into two categories. The f.c.c. and c.p.h. metals show a decided increase in capacity for work hardening at low temperatures, while b.c.c. metals show a decided decrease in ability to work harden.

Pronounced, repeated discontinuous yielding occurred in all the metals when tested at 4.2 K. The resulting stress strain curves were quite similar to the serrated curves produced by a strain aging mechanism for some materials at moderately elevated temperatures.

The accepted dislocation concept of the strain aging mechanism does not appear to be applicable for these low temperature observations of repeated yielding. It is difficult to conceive that any diffusion is taking place at 4.2 K.

The exact mechanism for repeated discontinuous yielding at extremely low temperatures has not conclusively been determined, but it is thought to be associated with repeated mass release (bursts) of dislocations triggered by the high stresses involved and aided by localized heating.

The appearance of this behavior in so many metals of different lattice structures suggests that one general mechanism may be responsible for the flow behavior of all metals at these low temperatures. —E. T. Wessel, Westinghouse Research Laboratories, Pittsburgh.

The Metal Selector For Special Alloys

Did you get your copy? Published in the Metal Show (Oct. 1) issue of STEEL, it compiles data on types, uses and availability of: 1. High strength, low alloy steels. 2. Superstrength steels. 3. Leaded steels. 4. Vacuum melted metals. 5. High temperature alloys. 6. Corrosion and heat resistant castings. 7. Spring alloys. 8. Special copper alloys.

You can get a copy free by writing Editorial Service, STEEL, Penton Bldg., Cleveland 13, O. Request: "Metal Selector for Special Alloys." For quantities, the price is 10 cents a copy.

Iron-Aluminum Alloys

Mechanical Properties of Iron-Aluminum Alloys—The unique electrical, magnetic and refractory properties of iron-aluminum alloys have long stimulated the interest of metallurgists. Unfortunately, their room temperature brittleness has retarded their development. The present program was undertaken in an attempt to uncover some of the underlying causes of this brittleness.

Iron-aluminum alloys, like many other body-centered-cubic materials which contain oxygen, carbon and nitrogen, are susceptible to brittle fracture. This susceptibility is increased sharply by large grain size. Vacuum melting, casting and fabrication techniques were developed to achieve a minimum grain size in the final wrought alloys.

The effect of heat treatment on the mechanical properties of iron-aluminum alloys containing small amounts of carbon and titanium was studied. Quenched iron-aluminum alloys containing carbon exhibited greater ductility than furnace-cooled alloys of the same composition. This difference was accentuated by the addition of 0.5 per cent titanium.

The yield and tensile strengths of both quenched and slowly cooled alloys increased progressively with aluminum content to a maximum at 14 per cent aluminum and then fell off rapidly. The ductility of all alloys decreased sharply beyond 10 per cent aluminum.

It is suggested that the effects of composition and heat treatment on the mechanical properties of the present alloys can be attributed partly to the occurrence of ordering.—W. Justusson, V. F. Zackay and E. R. Morgan, Ford Motor Co., Dearborn, Mich.

Castings

New Nodular Iron Process—Nodular graphite can be produced in cast iron by adding some alkali or alkali earth metals. But these metals react violently with molten iron unless they are diluted, and the diluting elements may be undesirable in the final casting.

A new process uses the halides of such metals as sodium and magnesium with a reducing agent instead of the active metals. Commercial cupola heats using mixtures of sodium and magnesium chlorides with calcium silicide as a reducing agent are described.

About 1400 tons of castings, varying from a few pounds to over 5 tons, have been cast so successfully that a 54-in. basic lined cupola with a melting rate of 10 tons an hour has been put into service.

In the new nodular iron process, no alloying elements are added to the melt unless desired. Return scrap can be used in any amount. The nodulizing ingredients are either common foundry materials or cheap, nonstrategic ones. Any gray iron foundry with basic lined cupolas or other methods for producing low sulphur iron can make

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PILOT LIGHT • Generous illumination and wide-angle visibility. Greatly reduced filament burn-outs. No loosening of lamp under vibration. Six colors—red, amber, green, blue, white, clear.

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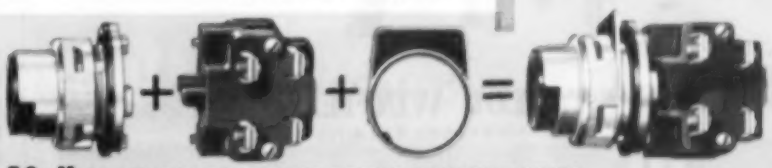

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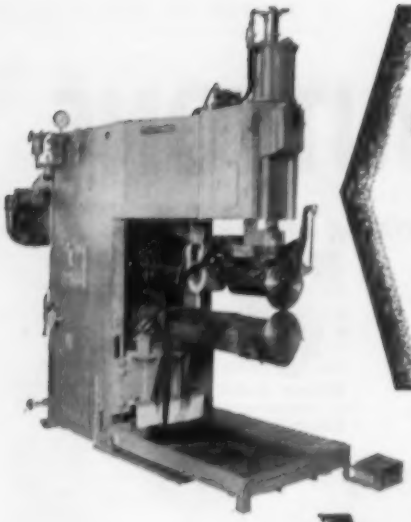

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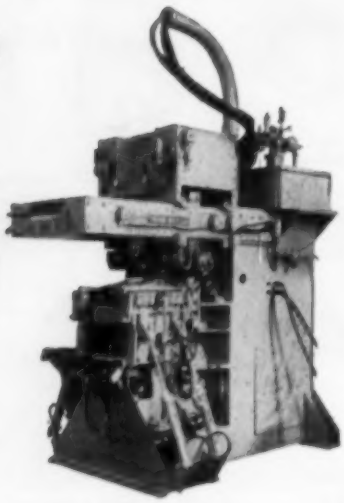

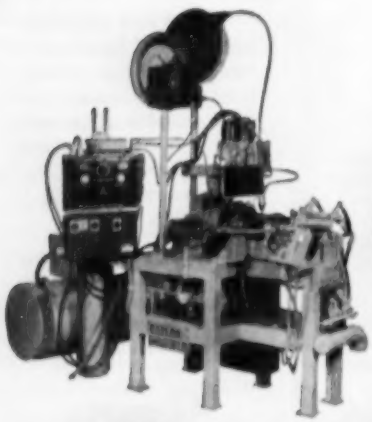

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WHAT'S NEW IN METALS

nodular iron by this process. No annealing furnaces are necessary. The reactions are nonviolent.

It is believed that this commercial process is a safer and better method of producing easily machinable and ductile nodular iron without annealing and without adding other elements with the nodulizing element.—Harry K. Ihrig, Allis-Chalmers Mfg. Co., Milwaukee.

Notch Ductility of Malleable Irons—Drop-weight tests of malleable irons were conducted to establish the temperature at which there is complete loss of ductility in the presence of a sharp, cracklike notch.

The subject temperature is defined as the "nil ductility transition" (NDT) and signifies that below this temperature the material cannot be made to deform even slightly in the presence of a sharp notch without the development of brittle fracture. The sharp, cracklike notch is developed by the use of a brittle weld (crack starter) ordinarily used for hard surfacing.

Explosion tests of plates with the crack-starter welds also were conducted to establish the relative resistance to the starting and propagation of brittle fractures at temperatures above the NDT temperature. For a range of temperatures above the NDT, fractures may be started only if "forcing" (drastic deformation) is applied; with further temperature increases, the propagation of fracture becomes possible.

This behavior has been observed in steels and nodular irons. The subject tests were aimed at determining if malleable irons behaved in a similar fashion.

Charpy V transition curves were established for various irons and related to the behavior of the irons in the drop-weight and explosion test. These studies were aimed at determining the significance of the Charpy V test for malleable irons and paralleled similar correlation studies made for other iron-base materials.—G. A. Sandoz, N. C. Howells, H. F. Bishop and W. S. Pellini, Naval Research Laboratory, Washington.

FAMOUS FIRSTS IN THE IRON & STEEL INDUSTRY

THE CHAIN THAT STOPPED THE BRITISH NAVY

During the War for Independence, the iron industry expanded greatly because of the increased demand for cannons, cannon balls and other war materials. However, one of the most interesting and outstanding contributions towards the cause was a chain that stopped the British Navy from going up the Hudson River beyond the Fort at West Point.

In 1778, the Sterling Works, some 25 miles southwest of West Point, operated all their forges day and night to make a massive chain 1500 feet long. Each link was 2 feet long and weighed 100 pounds. This chain was carried to West Point, floated on logs and stretched across the Hudson, where it made a formidable barrier no British gun boat dared to cross.

BAKER'S MAGDOLITE, the original dead-burned dolomite makes an important contribution to steel producers. MAGDOLITE offers you more uniform ingots, and better furnace efficiency at lower refractory costs. BAKER'S MAGDOLITE is always 5 ways better: Composition, Preparation, Strength, Economy and Quality, so the next time you order dead-burned dolomite, specify BAKER'S MAGDOLITE.

4-55

ANOTHER FAMOUS FIRST

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Dip Brazed Parts Take the Heat

Glenn L. Martin Co. has dip brazed assemblies to withstand temperatures of 1500°F. Corrosion resistance, hardness and tensile values remained high

X75

301 stainless brazed to 321 stainless with manganese-nickel filler metal

X75

17-7 PH steel brazed with copper paste

THE GREATEST impetus in the development of high temperature metals and joining techniques has been the advent of supersonic aircraft and missiles.

Higher speeds require increased power. Engineers must cope with greater internal heat from the engine, greater external heat from skin friction.

Brazing—A leading researcher in dip brazing of steels for high temperature applications is Glenn L. Martin Co., Baltimore. Engineers there have dip brazed assemblies to withstand temperatures up to 1500°F.

Stainless and low-carbon steels were the basic parent metals used in the development of the process. Inconel and Inconel-X also were tested. Test samples were T-joints and tube-to-header joints.

Results — Stainless steel types 301, 302, 304, 321 and 347 were brazed satisfactorily. They showed good workability, retaining high resistance to corrosion; hardness values were not lowered appreciably. Inconel-X and 17-7 PH were brazed satisfactorily, but a post heat treatment is recommended to increase tensile and hardness values which may have been lowered during brazing.

The low-carbon steels (4130 and 1025) became embrittled during dip brazing. The original working characteristics of these steels can be recovered by annealing and normalizing.

Most satisfactory filler metals were copper, nickel-chrome, nickel-silicon and silver manganese.

Procedure—Parts were cleaned and degreased, then preassembled for brazing. They were preheated by suspending them over the dip bath crucible for 20 to 30 seconds.

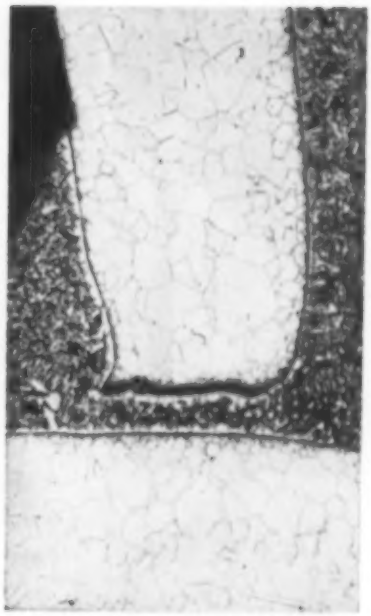
Parts were preheated to about 700°F without oxidizing surfaces.

X75

321 stainless brazed in Inconel with Nicrobraz (nickel-chrome) filler metal

X75

301 stainless brazed to 302 stainless with Coast Metal #51 (nickel-silicon) powder

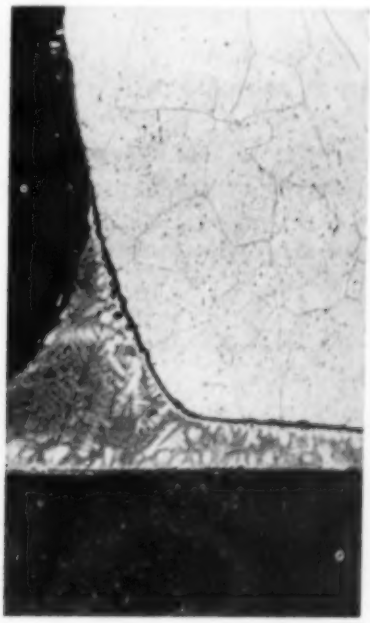


X75

301 stainless brazed with Nicrobraz

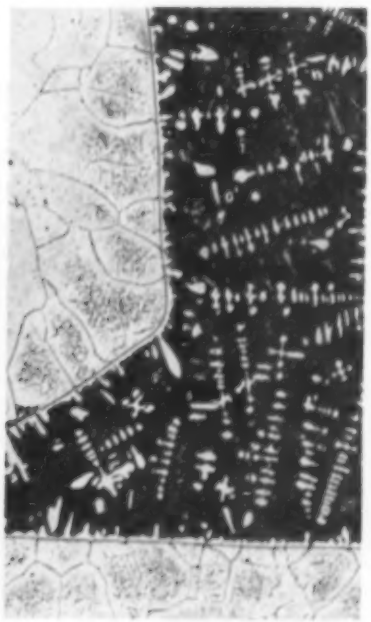
X75

4130 steel brazed to 302 stainless with silver-manganese filler metal



X75

1025 steel brazed to Inconel with sheet copper



X75

Inconel brazed with Coast Metal #51 powder

Preheating to 800°F or above is likely to cause oxidation which cannot be removed in the salt bath and will prevent parts from being brazed.

Bath—Test parts were immersed in a molten solution of 85 per cent barium and 15 per cent strontium-chloride salt until they reached brazing temperature (2050°F). Time at temperature was 2 to 2½-minutes.

To remove the salt, parts were: 1. Dipped in hot water. 2. Quenched in cold water. 3. Immersed for 1 minute in a 70 per cent sulphuric acid solution. 4. Immersed for 3 minutes in a solution of nitric - hydrofluoric acid at 150°F. 5. Dipped in hot water. 6. Rinsed in cold water.

RANSBURG
Electro-Spray
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Look what Ransburg Electrostatic Spray painting is doing in this eastern job shop, the Del-Val Finishers Division of J. W. Rex Company, Lansdale, Pa.

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The versatility and flexibility of Ransburg Electro-Spray makes it ideal for their varied painting requirements. Here's a typical example. Del-Val recently completed a contract for a Philadelphia manufacturer of barbecue trays with these results:

50% INCREASE IN PRODUCTION

50% SAVINGS IN LABOR and OVERHEAD

66% CUT IN PAINT COSTS, with improved, more uniform, and higher quality finish.

The job—flat sheet steel, 11" x 19"—enamel coated to withstand a 90 bend with sharp radius. Full coat one side; mist coat other.

WITH RANSBURG ELECTRO-SPRAY		BY FORMER HAND SPRAY	
Output, 375 panels per hour with 3 men		Output, 250 panels per hour with 4 men	
	per panel		per panel
Labor and overhead	.06	Labor and overhead	.12
Paint & lease cost	.017	Paint cost	.044
TOTAL COST	.077	TOTAL COST	.164

Want to know what Ransburg Electro-Spray can do for you in YOUR finishing department? Write for our new No. 2 Process brochure. It tells the WHAT & HOW of electrostatic spray painting, and with numerous production-line examples, shows how other manufacturers are cutting finishing costs . . . increasing production, and improving the quality of their work with Ransburg equipment. Too, we have available now a new movie, "The Big Attraction," a 27-minute sound and color film on electrostatic spray painting.

Ransburg ELECTRO-COATING CORP.
Indianapolis 7, Indiana

RANSBURG

Pipe Saver

Plastic is a quality material that resists corrosives for long periods at low cost

IT'S easy to handle corrosive muriatic acid when you use PVC (plastic) pipe. An installation at an eastern steel mill cost 80 per cent less than other types of acid resistant materials. The plastic may last indefinitely.

Lightweight — PVC (unplasticized polyvinyl chloride) carries the acid at normal atmospheric temperatures to and from the mill's terminal pit and cleaning house. Because the plastic weighs only 15 per cent as much as steel, and no welding or threading is needed, the installation was easy to complete in record time.

The plastic pipe has an unusually low friction loss because it is smooth inside. Pressure drop is less. Pumping costs are down.

Method—Pipe for the job was supplied by the Alloy Tube Division, Carpenter Steel Co., Union, N. J. Fittings are the socket type. Only a solvent cement is needed to join them to the pipe. Most of the standard pipe fittings, such as ells, tees, reducers, bushings, caps and couplings, are made of plastic.

The piping system begins at the terminal pit where incoming tank trucks unload the acid. Compressed air at 30 psi forces it through the line.

From the pit, 2-in. pipe travels 3 ft underground, across a road and into an acid storage tank beside the cleaning room.

Except for diaphragm valves, all valves are plastic. Threads are used for joints instead of cement.

The diaphragm valves are made with steel bonnets and handwheels, so that diaphragms can be changed without removing the valve from the line.

Other Uses—PVC easily handles a wide variety of liquids that are too tough for other materials. Plating installations, chemical plants and metalworking companies find its resistance to oxidizing and reducing conditions are a big advantage.

Plastic pipe is usually limited to applications where temperatures are less than 200° F.

Automatic Welder Does CO_2 and Submerged Arc Operation

Front-mounted dials on this machine permit quick and accurate setting of arc voltage and current. Controls are housed in a NEMA, type 12, dust-tight enclosure.

Inching of the wire, flux dampening and arc starting are done automatically by Model SA-40A. With Model SA-40, these operations are done by hand.

Both models can be used for CO_2 gas metal-arc or submerged-arc, direct-current welding.

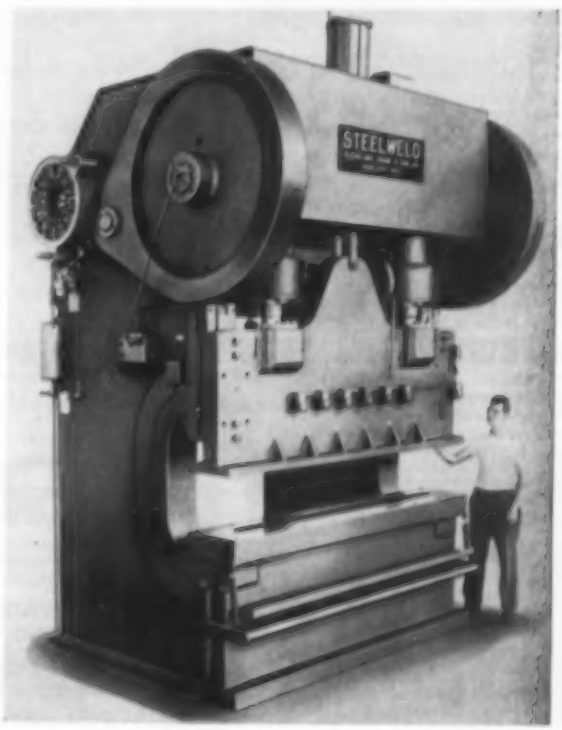
Each model has a heavy duty welding head, control, operator's remote control station and cables.

The welding head can drive wire 5/64 to ¼-in. in diameter up to 300 ipm; bead contour is uniform and craters are eliminated.

The head motor and rear train enclosures mount together to form a single cylindrical case which is mounted on a universal supporting frame.

The head can be rotated 360 degrees in two planes. *Write*: Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. *Phone*: Express 1-2800

Press Brake of 400-Ton Capacity Fills Punching Needs



This unit makes 30 strokes a minute; stroke length is 2 in. Low punch velocity and minimum impact make for long punch life.

Punching slugs are received in a slot 3 in. wide in the double-plate bed. The bed is 17 x 100 in.

The clutch and brake are air-operated and designed for low inertia. Discs are hollow at the center to enable passage of large volumes of air. Unit working pressure on clutch and brake facings is low. These features assure cool operation even after long periods of continuous production.

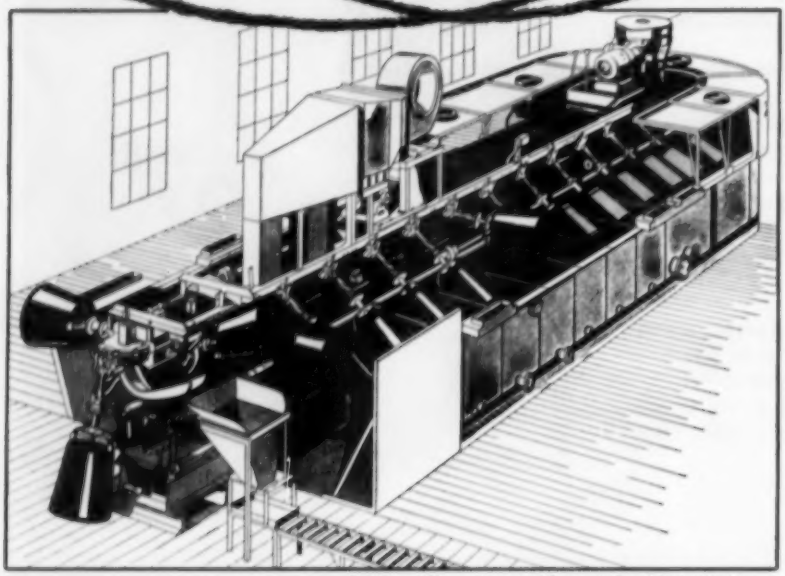
Controls are provided for two-man operation. Three pushbuttons for each man are mounted on the ram. Before the press can be set in motion, four of the buttons must be depressed—both hands of the two men must be in position.

One button in each group is for stopping; either operator can stop the press quickly.

When the press is operated by one man, one set of three buttons can be locked out of the control circuit.

A motor-driven ram adjusts shut height. Other features: Air counterbalance for the ram, automatic oilers for bearings, ram ball joints with replaceable bearings, rigid one-piece welded steel frame, 18-in. deep throat. *Write*: Steelweld Machinery Division, Cleveland Crane & Engineering Co., E. 289th St., Wickliffe, O. *Phone*: Wickliffe 3-3700

Barrel Plating by Stevens Really Cuts Costs



End View of Stevens Super "E" Automatic Barrel Plating Machine.

Since Stevens first introduced the Automatic Barrel machine scores of industries have enjoyed these operational advantages. Check them against your present operations.

MINIMUM LABOR REQUIRED — In most cases, one unskilled employee can operate the machine.

HANDLES THE COMPLETE CYCLE — Including cleaning, pickling, chromate treatments, plating, bright dip and drying.

COMPLETELY AUTOMATIC — No barrel lids to fasten and unfasten during automatic loading and unloading.

BETTER HANDLING — No mixing of parts. Becomes a part of a straight line production system.

NO HEALTH HAZARD — Occupational health hazards eliminated with ventilation of equipment.

UNIFORMITY OF PLATE — Accurate plating cycles timed to meet your requirements.

FITS ANY PLANT LOCATION — Does not need special buildings—Can be moved at any time. Low head room.

DEPENDABLE — Scores of machines in use. Machine design and construction constantly improved.

LOW INITIAL COSTS — For average operation lowest initial machine costs.

LOW MAINTENANCE COSTS — Proven over years of use and in varied operations

FREDERIC B. STEVENS INCORPORATED YOUR METAL FINISHING SUPERMARKET DETROIT 16, MICHIGAN

Let a Stevens Sales Engineer show you how you can cut costs in your plating operation with a Stevens Automatic Barrel. Write us direct. Frederic B. Stevens, Inc., 1816-18th Street, Detroit 16, Michigan.

METAL FINISHING EQUIPMENT AND SUPPLIES, FROM CASTINGS OR STAMPINGS TO FINISHED PRODUCT

BRANCHES:

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Offices in Principal Cities

NEW PRODUCTS and equipment

Dust Collectors

Large volumes of bulky, sticky dust are handled by series 55 collectors. Exhausting capacities range from 1000 to 1100 cu ft of air a minute.

The collectors feed directly into standard 55-gallon (or smaller) drums which can be replaced quickly when full.

The cyclone-type collectors use centrifugal force to precipitate all but the finest dust particles (up to 95 per cent); the other 5 per cent is exhausted outside or trapped in an efficient after-filter bag. *Write*: Department KP, Torit Mfg. Co., 287 Walnut St., St. Paul 2, Minn. *Phone*: Capitol 2-4419

Industrial Tractor

This heavy duty tractor for trailer trains operates on liquefied petroleum gas.

LP gas operation offers easy starting, long engine life, moderate maintenance costs, elimination of obnoxious exhaust fumes and low oil consumption.

Simplified construction of the LP gas system—filter, carburetor, solenoid valves, regulator, car-

NEW PRODUCTS and equipment

buretor adapter and supply tank—makes maintenance easy.

High compression ratios assure maximum power. Stellite valves and inserts and positive valve rotors add to engine life. *Write*: Mercury Mfg. Co., 4044 S. Halsted St., Chicago 9, Ill. *Phone*: Yards 7-2513

Thickness Gage

The Precisionaire measures thickness and parallelism of half-moon type retaining rings and permits classification in 0.0001-in. increments for selective assembly.

A glance at the position of three floats in the gage tells if the ring is within tolerance and parallel. Inspection rate: 400 to 500 parts an hour. *Write*: Standard Production Instruments Division, Sheffield Corp., Dayton, O. *Phone*: Kenmore 3131

Portable Conveyors

Here are two belt conveyors for loading and unloading trucks and railroad cars. The conveyors can be expanded into the vehicles from loading docks and are easily moved and set up as a part of a conveyor system.

The larger conveyor has a distributed load capacity of 4000 lb. Its minimum length of 26 ft can

Because they are produced by *turning*, rather than by less accurate methods, Fischer brass and aluminum nuts set new standards of precision and quality that speed assembly operations . . . reduce costs. Uniformly accurate, Fischer nuts are tapped square with the face to Class 2 tolerances . . . countersunk on both sides . . . burrless . . . cleaned and degreased before delivery.

You pay no premium for Fischer *precision-turned* nuts . . . they're priced no higher than those made by less exact methods.

Prompt delivery of all standard types and sizes is assured by large factory stocks . . . "specials" can be produced quickly and economically.

HERE . . . take a look at precision

Investigate the savings possible with Fischer turned nuts. Write today for Catalog No. 55.

Fischer
SPECIAL MFG. CO.
476 Morgan Street
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Look Overhead··· see "NORTHERN"

these notable twins assure dependability

LOCATION — *Press bay of a large, new plant manufacturing rear axle parts and components for automobiles and trucks.*

SPAN — *96 feet 10 inches, centers of runways.*

CAPACITY — *30-tons on Main Hooks, 10-tons on auxiliary hooks.*

ELECTRICAL EQUIPMENT — *60-HP motors on Main Hoist, Auxiliary Hoist and Bridge Travel, and 15-HP motor on Trolley Travel, with full magnetic control and direct current on brakes.*

ADVANTAGES—These twin NORTHERN cranes serve twin heavy press lines located at each end of the press bay. Designed for heavy duty requirements with compensating type bridge end trucks, and equally suitable electrical equipment and controls, they dependably and safely speed machinery installation or relocation, and assure smooth, uninterrupted flow of work in today's and tomorrow's automated production.

Let us explore similar possibilities in your plant

NORTHERN MATERIAL HANDLING EQUIPMENT

NORTHERN ENGINEERING WORKS

210 CHENE ST. • DETROIT 7, MICH.

NEW PRODUCTS and equipment

be expanded to 43 ft. A 2-hp motor moves its 16-in. wide belt at 78 fpm.

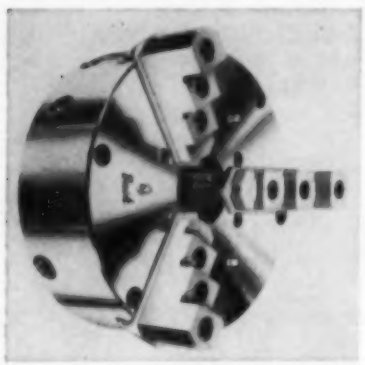
The small unit has a distributed weight capacity of 1000 lb. It is 15 ft long and can be expanded to

25 ft. Its 16-in. belt is powered by a 1-hp motor at 75 fpm.

Both units are mounted on six casters. *Write*: Colson Corp., Elyria, O. *Phone*: Circle 7-5000

Dustproof Chuck

This tool is for grinding machines and dividing heads where abrasive dust and metal chips are a problem. It can be used either wet or dry.



The full capacity range of the unit can be used because the dustproofing mechanism does not interfere. The chuck has a hole through the center. *Write*: Buck Tool Co., 2015 Schippers Lane, Kalamazoo, Mich. *Phone*: 2-0171

Hexagonal Locknuts

This line of counterbored, self-aligning locknuts is used on non-parallel surfaces.

The nut tilts 8 degrees from the center line in any direction to compensate for angular misalignment of fastening surfaces. Tightening the bolt automatically seats the nut in the base and adjusts it to the proper angle.

Machining, milling, individual selection of tapered shims or other

WENDT-SONIS

*NO-CHAT shanks increase tool life

"No-Chat" is an ideal body material for boring bars. Very dense and rigid, "No-Chat" reduces vibration and chatter and eliminates taper in deep hole boring. Heavier cuts can be taken and hole finish is improved. Straight, accurate holes are possible even with excessive tool overhang.

"No-Chat" grinding quills give better finishes to closer tolerances.

Cut-off tools of "No-Chat" can be made narrower to reduce waste. Higher strength permits greater feeds and deeper cuts by minimizing deflection and reducing chatter.

"No-Chat" is available in round, square or rectangular stock or as finished tools with brazed or mechanically held tips.

For more information ask your local Wendt-Sonis distributor or fill in the attached coupon.

WENDT-SONIS COMPANY
HANNIBAL, MISSOURI
ROGERS, ARKANSAS

*"No-Chat" is a registered trade name of the P. R. Mallory Co.

WENDT-SONIS COMPANY
Dept. SMN-1056, HANNIBAL, MISSOURI

Please send me literature on Wendt-Sonis "No-Chat."

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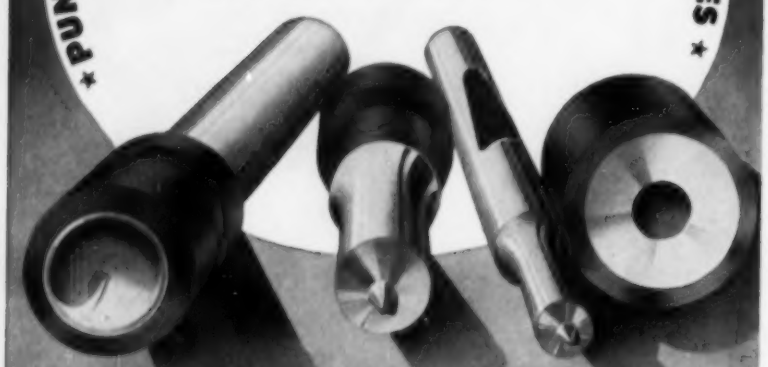
52 Years making quality punches and dies. Our many customers throughout the nation repeat year after year because they know they can rely on our tools for consistent performance.
Write Dept. A for New Catalog 54



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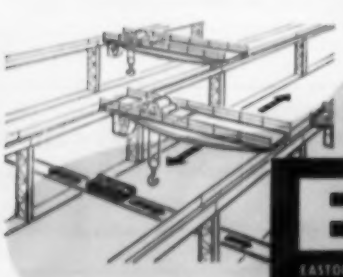
1420-34 So. ROCKWELL STREET · CHICAGO 8, ILLINOIS

CROSS-BAY® CAR
GASOLINE-HYDRAULIC
(Also available with electric or storage battery power)

Above: 25-ton car, gasoline-hydraulic



CUSTOM-BUILT in capacities from 5 to 500 tons. Supplements overhead crane work in multiple-bay plants. Also for low-cost, heavy-duty service between buildings, storage and shipping areas.
Write or telephone for technical information.

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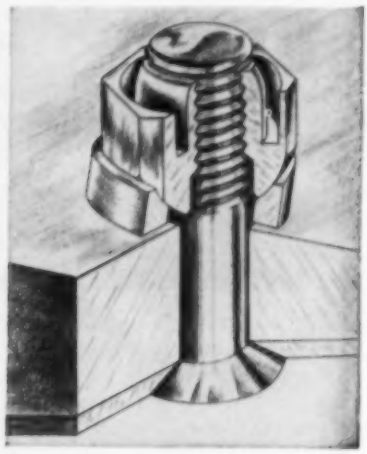
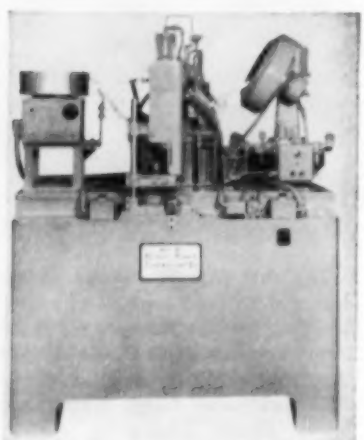
NEW PRODUCTS and equipment



preparation of bolting surfaces are eliminated. *Write*: Elastic Stop Nut Corp. of America, Union, N.J. *Phone*: Murdock 6-6000

Assembly Machine

Rolling hangers for products such as sliding doors and sliding screens are assembled semiautomatically by this machine.



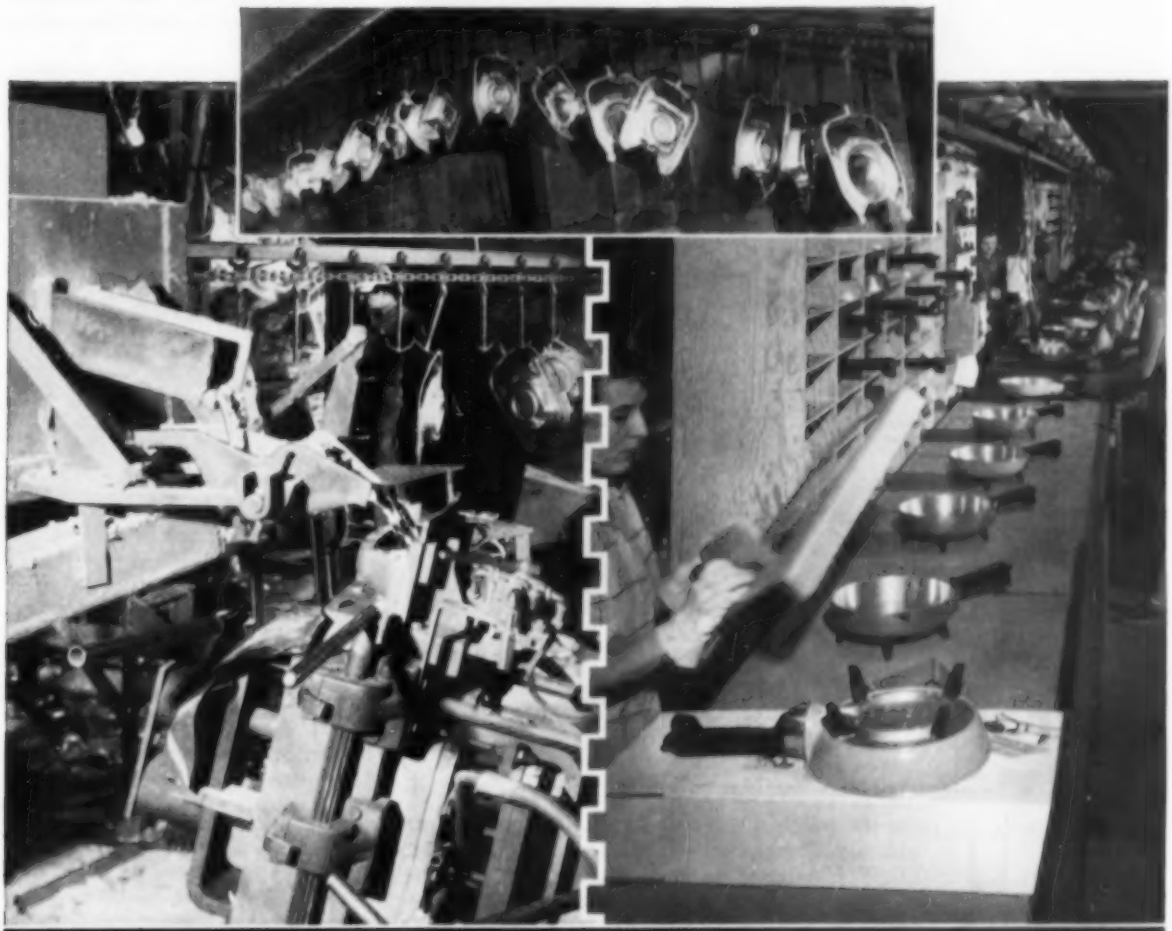
Three feeding devices feed three components. Each component is preassembled. *Write*: Detroit Screwdriver Co., 2801 W. Fort St., Detroit 16, Mich.

Mist Lubrication

During a 48-hour week, Oil-Mist lubricators continuously service up to 500 bearing inches.

The system uses compressed air to atomize oil, which is then distributed through tubing to bear-

MONARCAST* ALUMINUM PERMANENT MOLD PRODUCTION IS GEARED TO MASS-ASSEMBLY LINE DEMANDS



MORE CASTING VALUE PER DOLLAR

The aluminum permanent mold process is a mass production method—at Monarch. High volume foundry operations have been pioneered by Monarch to gear a steady flow of castings to your mass-assembly line requirements.

Monarcast* methods provide highest quality metal structure, superior strength and dimensional accuracy. Flexibility of production operations is achieved, even during periods of product modification.

Monarch's unique finishing services featuring Velvaglaze* and Spectraglaze* give you "one source" responsibility from rough castings through finished components.

"Non-competitive" experience in both aluminum permanent mold and aluminum and certified zinc die castings offer you factual answers on the right methods to obtain highest quality at lowest product end-cost.

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* Velvaglaze, Spectraglaze and Monarcast are Trade Marks of

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MANUFACTURERS OF: Aluminum Permanent Mold Castings • Zinc Die Castings • Aluminum Die Castings • Exclusive Velvaglaze Finishing • and Spectraglaze, colorful Porcelain Enamel on Aluminum Permanent Mold Castings.

SAVES ON EVERY LIFTING JOB

On the roughest, toughest heavy-duty cycle — or ordinary lifting jobs — the Series "700" 'Load Lifter' Electric Hoist gives you the best in load-handling performance and safety. It is a smooth-operating hoist, engineered to lift *fast* at the push of a button. In 2 seconds, a 1-ton load can be lifted a foot! It was the first hoist to have safe 24 volts at the pendant push-button.

Get new speed and cost-cutting power into your load handling with the Series "700" 'Load Lifter' Electric Hoist. Rarely needs maintenance, even under the most adverse operating conditions. Can be serviced *in the air*. Capacities up to 15 tons. Single and two-speed models. All types of suspension. Check with your "Shaw-Box" Distributor for details or write us for Bulletin 410.

MAXWELL MANNING MM&M MOORE INC. TRADE MARK

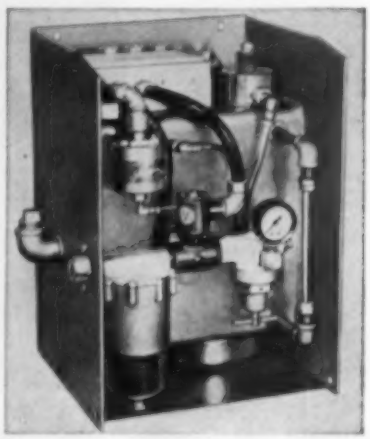
'Load Lifter' ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Makers of 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

NEW PRODUCTS and equipment

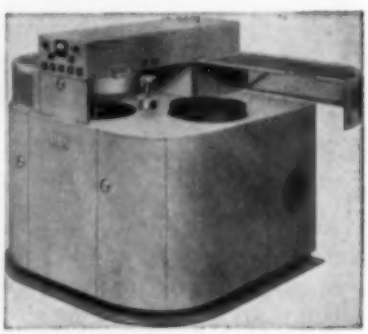
ings, gears, slides, ways, chains, cams, rollers, etc. The lubricators work efficiently over a distance of 400 ft.



The clean, dry flow of air through the bearings acts as a coolant. *Write*: Alemite Division, Stewart-Warner Corp., 1826 Diversey Parkway, Chicago 14, Ill. *Phone*: Lakeview 5-6000

Spin Test Machine

Cutoff saws and grinding wheels are tested with this machine. Loading, spinning and unloading are automatic. Acceleration and deceleration are adjustable and smooth.



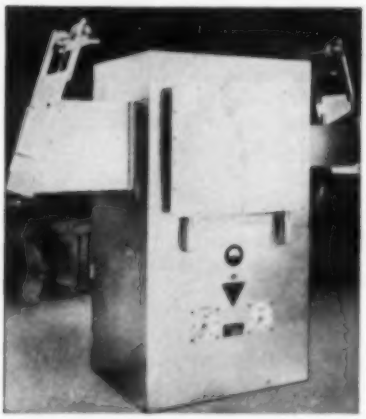
Machines operate only when safety housings are closed. *Write*: George L. Day Co., 1227-31 Niagara St., Buffalo 13, N. Y. *Phone*: Garfield 5470

Sintering Furnace

Model SNX-81072 is an electric, manual pusher type furnace with an operating temperature of 2500° F. It can be used for a variety of

heat treating work, including brazing, sintering, etc.

The three-zone, straight line furnace is heated by silicon carbide elements positioned over and under the chamber. The preheat zone is 29 x 10 x 8 in.; the hot zone is 24 x 10 x 8 in.; and the cooling zone is 26 x 10 x 8 in.

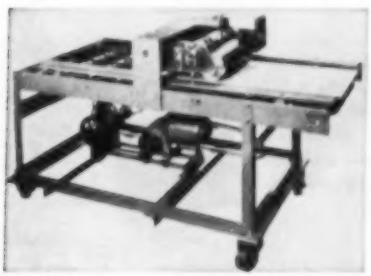


All controls are built in. *Write*: Pereny Equipment Co., 893 Chambers Rd., Columbus 12, O. *Phone*: Axminster 9-8444

Sheet Metal Printer

Symbols, numbers, codes, trademarks and descriptions are printed continuously on sheet zinc, aluminum, magnesium, steel, copper or plastic by this machine.

Laminate coatings also can be laid on by using precision-turned rolls for the metered application of hot melts, adhesives, plastics, etc.



The standard machine handles sheets 0.025 to 0.250 in. thick, 14 to 24 in. wide and 34 to 42 in. long.

Printing speeds are adjustable up to 2800 sheets an hour. *Write*: Industrial Marking Equipment Co. Inc., 454 Baltic St., Brooklyn 17, N. Y. *Phone*: Main 4-2601

...but there's still ONLY ONE MALLEABRASIVE

Imitation, they say, is the most sincere form of flattery. Well then, it's small wonder that we're flattered.

Ever since 1939 when we developed and introduced MALLEABRASIVE, it's been imitated. Yes, imitated—*but never equalled!*

Today, MALLEABRASIVE is still the leader; it's been *kept* better—kept ahead, by continuing research and by constant adoption of the most modern quality-control manufacturing facilities.

So—in plant after plant, MALLEABRASIVE continues to prove itself—continues to prove by daily production cost records that it cleans at lower cost—continues to prove that there is only one genuine Malleabrasive.

If you want to see samples of the forms used by so many plants in proving Malleabrasive's lower cost, write us.

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MANSFIELD, OHIO

Sold and recommended by Pangborn Corporation, Hagerstown, Md.

IN 50 POUND DOUBLE BURLAP BAGS

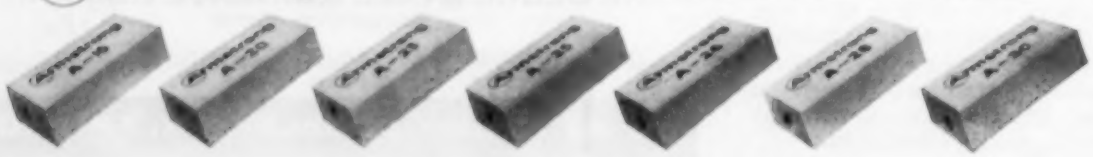
Cement...

save money and reduce inventory with this all-purpose refractory mortar

You need only one air-setting mortar, Armstrong C199 Cement, to bond all types of fire brick as well as insulating refractories at temperatures to 3000° F. By standardizing on this all-purpose cement, you can buy in economical quantities and simplify inventories. Furnace maintenance costs are cut, too. Armstrong C199 Cement bonds tightly, providing tight joints that prevent gases, heat, and slags from attacking the inner portion of the furnace wall construction.

For free booklet on C199 Cement and the full line of Armstrong Insulating Brick, write Armstrong Cork Company, 2410 Reed Avenue, Lancaster, Pa. If you have any refractory problems, sales engineers in your nearest Armstrong office will be glad to help you in any way.

Armstrong INSULATING REFRACTORIES



NEW Literature

Write directly to the company for a copy

Fire Extinguishers

A 10-page bulletin lists ratings of portable fire extinguishers and outlines the industrial fire code. Walter Kidde & Co. Inc., 675 Main St., Belleville 9, N. J.

Die Handling Trucks

Information on the design and operation of trucks that take dies on and off medium to large inclined presses is given in this bulletin. Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, O.

Restrictor Tubing

A capillary tube for metering the flow of liquids and gases and its use in refrigeration and air conditioning is described in a 4-page bulletin. Wolverine Tube Division, Calumet & Hecla Inc., Guardian Towers, Guardian Bldg., Detroit 26, Mich.

Coolant System

Bulletin 37, 2 pages, describes a self-contained coolant system for operations like drilling, tapping, milling and grinding. Trico Fuse Mfg. Co., 2948 N. Fifth St., Milwaukee 12, Wis.

Lift Truck

An electric fork lift truck with a capacity of 2500 lb is described in bulletin 33-E, 2 pages. Department 32, Lewis-Shepard Products Inc., Watertown, Mass.

Scrapyard Cranes

Power cranes with lifting capacities of 10 to 95 tons are presented in bulletin K476, 4 pages. Koehring Co., Milwaukee 16, Wis.

Conveyor

A 4-page bulletin describes expanding conveyors that load and unload trucks without moving the basic section. Conveyor Department, A. B. Farquhar Division, Oliver Corp., 110 N. Duke St., York, Pa.

Motors

Features of open drip-proof motors (½ to 100 hp) are given in bulletin 51B6210G, 6 pages. Bulletin 51B7286G, 6 pages, describes explosion-proof motors of the same ratings. Totally enclosed, fan-cooled motors in these ratings are covered in bulletin 51B7225D, 6 pages. Allis-Chalmers Mfg. Co., 1021 S. 70th St., Milwaukee, Wis.

Aircraft Fasteners

High strength steel bolts that have a minimum tensile strength of 220,000 psi are discussed in a 12-page bulletin. A 4-page bulletin covers high strength locknuts. Standard Pressed Steel Co., Box 579, Jenkintown, Pa.

Piercing Methods

This 28-page booklet uses cartoons to dramatize short run piercing methods for flat sheet metal and plate. Department 343, Wiedemann Machine Co., 4272 Wissahickon Ave., Philadelphia 32, Pa.

Marking Machines

General purpose marking machines are described in a 4-page bulletin. Jas. H. Matthews & Co. Inc., 3942 Forbes St., Pittsburgh 13, Pa.

Spray Lubrication

Bulletin 60-A, 8 pages, presents equipment for centralized lubrication of heavy open gearing and slide surfaces. Farval Corp., 3249 E. 80th St., Cleveland 4, O.

Automatic Controls

Packaged photoelectric systems for industrial control are detailed in

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If you have some parts that seem to be out of line in price or are performing poorly, toss the problem to Formed Tubes' engineers. There is no obligation or cost to you; yet the use of formed tubes could make substantial savings for you. Call for a Formed Tubes' representative or write for the new illustrated booklet, "Take a Look at Formed Tubes."
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Two of America's Most Modern

22 BLISS HYDRO-DYNAMIC PRESSES WORK FOR BOTH ARMY AND NAVY AT EKCO PRODUCTS

At Ekco Products Company, Chicago, one line of Bliss presses ranging from 75 to 2500 tons produces 76 mm cartridge cases... and another line of eleven makes 3"/50 Navy cases.

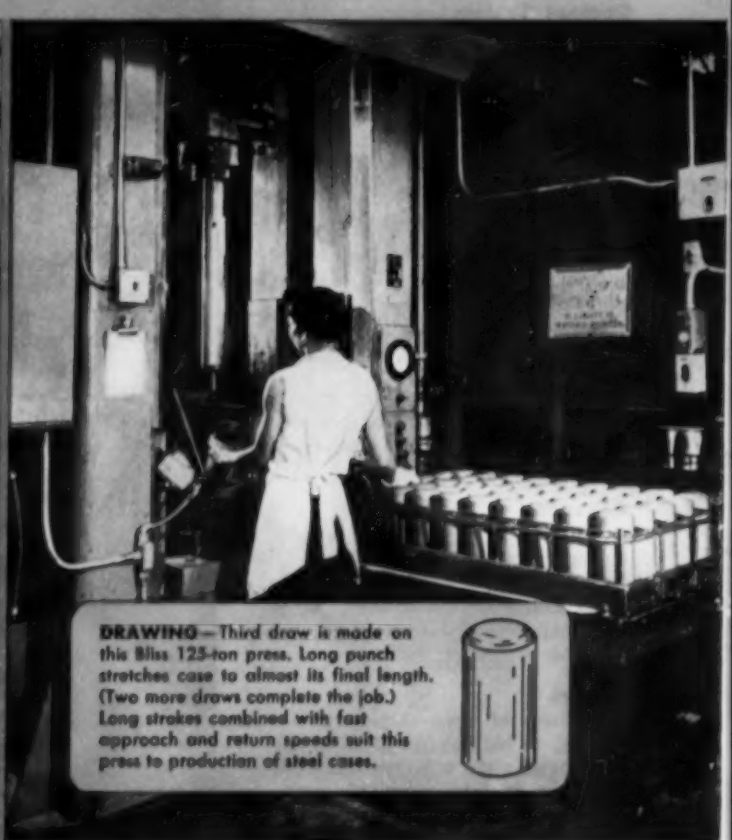
The speed at which the lines are operated is "classified" information, but you may be sure it is exceptionally fast. As a matter of fact, their performance so exceeded their original "specs" that the lines have become known throughout the ordnance world.

Press operations on both lines are the same—a series of eleven steps beginning with pre-cupping a steel blank, then cup, four draws, pre-head, final draw, heading, and two tapering operations. Only difference between the Army and the Navy lines is a slight variance in tapering techniques.

Designing and building entire ordnance lines, both hydraulic and mechanical, has been a specialty of Bliss since Spanish-American War days. Today, Bliss press lines are as common throughout ordnance as they are throughout industry at large.

If you have a pressed metal problem, put this experience to work—let Bliss help you pick the one right press—or press line—for the job.

PRE-CUPPING—Army and Navy case production on each line begins with a Bliss 250-ton single-action Hydro-Dynamic press. First operation on press at right is pre-cupping flat disk blank. Blanks move from there into a second 250-ton press for cupping.



DRAWING—Third draw is made on this Bliss 125-ton press. Long punch stretches case to almost its final length. (Two more draws complete the job.) Long strokes combined with fast approach and return speeds suit this press to production of steel cases.

BLISS
SINCE 1857

is more than a name... it's a guarantee

E. W. BLISS COMPANY, Canton, Ohio

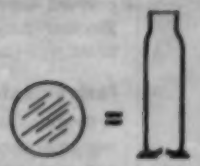
Presses, Rolling Mills, Rolls, Special Machinery

Steel Cartridge Case Lines

HYDRO BLISS DYNAMIC

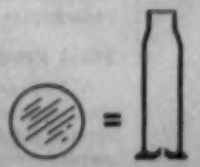
Eleven Press Operations On Each Line

ARMY



From this...to this

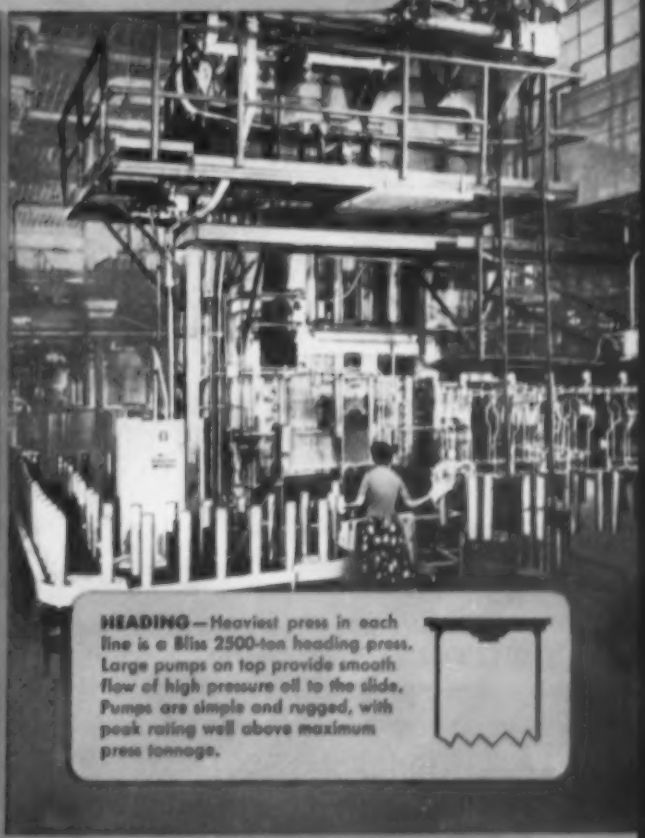
NAVY



From this...to this

OPERATION	PRESS	CAPACITY
1. Pre-Cup	Bliss HS250	250
2. Cup	Bliss HS250	250
3. First Draw	Bliss HS200	200
4. Second Draw	Bliss HS150	150
5. Third Draw	Bliss HS125	125
6. Fourth Draw	Bliss HS100	100
7. Pre-Head	Bliss HS1500	1500
8. Fifth Draw	Bliss HS75	75
9. Head	Bliss HS2500	2500
10. First Taper	Bliss HS75	75
11. Second Taper	Bliss HS75	75

PRE-HEADING—This 1500-ton press, which pre-heads cases, is equipped with a Bliss-designed shuttle, allowing it to be loaded with one case while another is still in the press. Shuttle makes it easier to load and unload thus speeding production.



HEADING—Heaviest press in each line is a Bliss 2500-ton heading press. Large pumps on top provide smooth flow of high pressure oil to the slide. Pumps are simple and rugged, with peak rating well above maximum press tonnage.

U. S. Plants: Canton, Cleveland, Salem and Toledo, Ohio; Detroit and Hastings, Michigan; San Jose, California, Midland and Pittsburgh, Pa. Branch Offices: Boston, Burbank, Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Pittsburgh, Philadelphia, Rochester, Salem, San Jose, Toledo, Washington, D. C. and Toronto, Canada; E. W. Bliss (England) Ltd., Derby, E. W. Bliss Co., (Paris), France. Other representatives throughout the world.

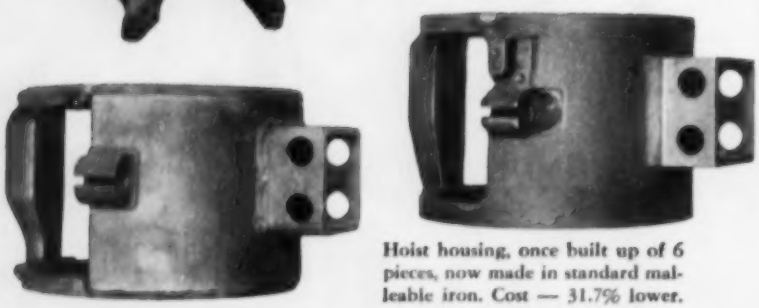
How About Malleable?

Strong on cost saving features . . . and strong on physical properties

Malleable iron castings simplify design and production, improve appearance of finished product.

Malleable foundries are helping manufacturers of innumerable products to solve parts problems with this versatile material. Examples multiply daily — a wide range of shapes, sizes and weights. Standard and pearlitic malleable castings offer broad opportunities for simplifying design, reducing weight, increasing strength and *lowering production costs.* Here are two recent interesting examples:

Shifter fork, formerly 3 pieces, produced in one pearlitic malleable iron casting at a cost reduction of 44½%.



Hoist housing, once built up of 6 pieces, now made in standard malleable iron. Cost — 31.7% lower.

Malleable iron, in use for over 130 years, has many remarkable properties. It will pay you to consult your nearest malleable foundry, or write to this Society for information.

Malleable FOUNDERS' SOCIETY

1800 Union Commerce Building — Cleveland 14, Ohio

NEW LITERATURE

bulletin PA 561, 24 pages. Photoswitch Division, Electronics Corp. of America, 1 Memorial Drive, Cambridge 42, Mass.

Scale Control

Bulletin 300 R, 4 pages, describes units that treat water electrically to prevent hard scale formation. Aqua Electric Scale Control Inc., 2026 E. 22nd St., Cleveland 15, O.

Instrumentation

Systems used in recording, indicating and controlling are described in a 4-page bulletin, F-403. Fielden Instrument Division, Robertshaw-Fulton Controls Co., 2920 N. Fourth St., Philadelphia 33, Pa.

Steel Products

A 70-page catalog covers semifinished and hot-rolled steel, heavy and special steel items, rails and accessories, wire and wire products, rope, industrial screens and wire fabrics, springs, formed wires and other products. Colorado Fuel & Iron Corp., 575 Madison Ave., New York, N. Y.

Drill Press Feed

A drill press feed for controlled automation is presented in a 4-page bulletin. Air Control Division, Lehigh Inc., Easton, Pa.

Metallic Powder Cutting

Bulletin ADC 839A, 4 pages, presents a line of equipment for cutting and washing stainless steels, other high alloy steels and cast iron. Air Reduction Sales Co., division of Air Reduction Co. Inc., 150 E. 42nd St., New York 17, N. Y.

Motor Drives

Variable speed drives (⅛ to 25 hp) are presented in bulletin 1610-B1 P, 8 pages. Motor pulleys (⅛ to ¾-hp) are covered in bulletin 1630-B1 P, 8 pages. Advertising & Sales Promotion Department, Worthington Corp., Harrison, N. J.

Magnetic Force Welders

Bulletin MF-100, 6 pages, gives advantages of magnetic force welding critical materials. Precision Welder & Flexopress Corp., 3520 Ibsen Ave., Cincinnati 9, O.

Weights and Measures

This 96-page book of tables includes information on sheet gages, hardness and temperature conversion, properties of metals and their weights, pipe sizes, relative sizes of

NEW LITERATURE

ingots and forgings at various reductions and properties of wrought aluminum alloys. Mesta Machine Co., P. O. 1466, Pittsburgh 30, Pa.

Turret-Type Drill Head

With this automatic indexing drill head you can operate any vertical single spindle drill press as a multi-spindle unit. Details are in a 4-page bulletin. Jersey Mfg. Co., 453 Livingston St., Elizabeth, N. J.

Control Systems

Bulletin SF 9901, 16 pages, describes industrial control systems and equipment for infrared measurement and control. Servo Corp. of America, 20-20 Jericho Turnpike, New Hyde Park, N. Y.

Heat Transfer

Platecoil heat transfer units and their advantages are described in bulletin IP-356. Platecoil Division, Tranter Mfg. Inc., Lansing 4, Mich.

Plastic Tooling

Uses of plastic tooling in foundries and in metal forming are presented in an 8-page bulletin. Marblette Corp., 37-31 30th St., Long Island City 1, N. Y.

Protective Coating

This 4-page bulletin describes a strippable, nonoil exuding compound that protects metal parts and tools. Bischoff Chemical Corp., Ivoryton, Conn.

Threaded Inserts

A catalog describes rivet type threaded inserts that provide a deep, full thread. They may be installed in any sheet material. Standard Insert Co., 12270 Montague St., Pacoima, Calif.

Hardsurfacing Rods

Here is a chart which aids in the selection of hardsurfacing welding materials. Department R-3, Rankin Mfg. Co., 616 S. Marengo Ave., Alhambra, Calif.

Selenium Rectifiers

Bulletin GEA-6545, 12 pages, presents data on ¾ to 125-kw rectifiers. General Electric Co., Schenectady 5, N. Y.

Spray Nozzles

Bulletin 5600, 28 pages, specifies over 100 industrial spray nozzles. Binks Mfg. Co., 3122 Carroll Ave., Chicago 12, Ill.

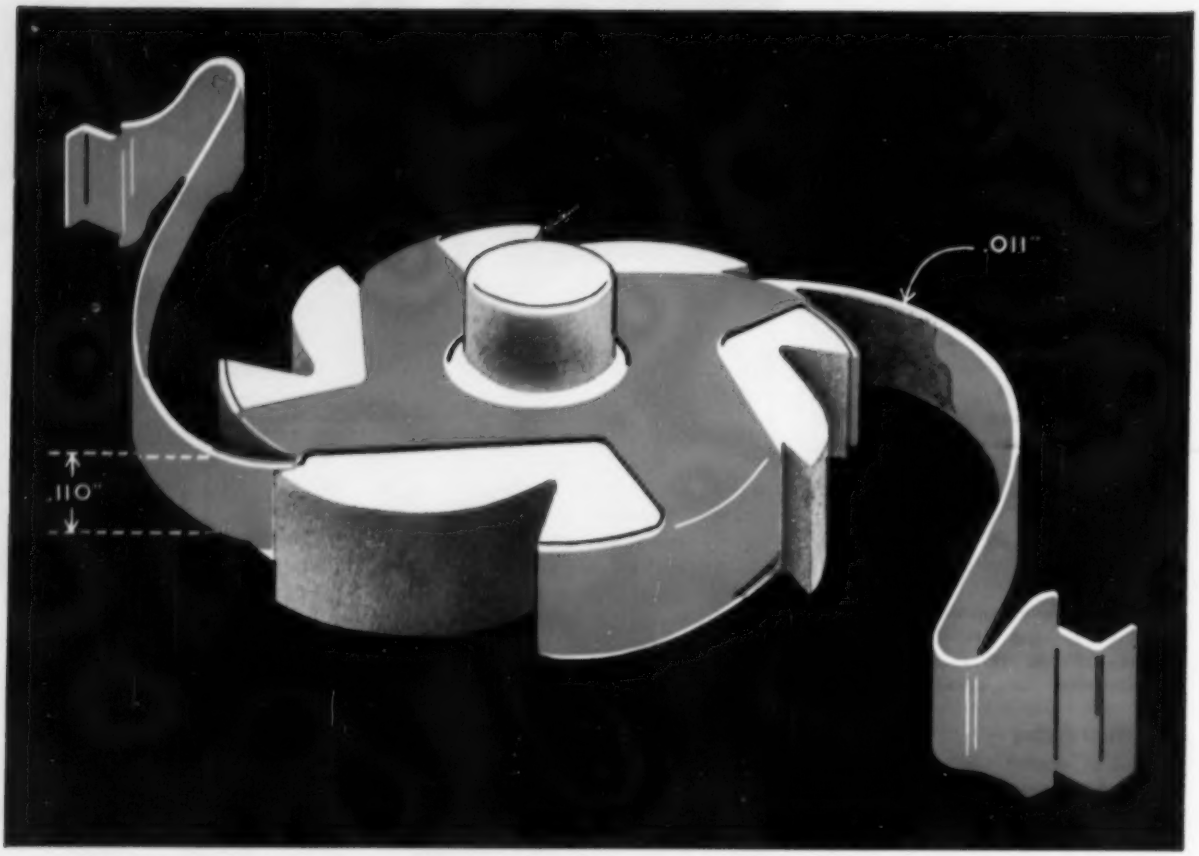
A Conco engineered Crane is **top management's** idea of value. Quality like this means minimum maintenance cost, slow depreciation, tailored-to-the-job engineering, reduced accident hazards. Conco engineered Cranes reflect the more than 37 years experience that lies behind them. Write for bulletin 5000A covering the complete line of Conco cranes, hoists and trolleys.
FROM ANY VIEWPOINT
A FINER CRANE
CRANES HOISTS
CONCO

CONCO ENGINEERING WORKS

Division of H. D. Conkey & Company 70-14th Ave., Mendota, Illinois

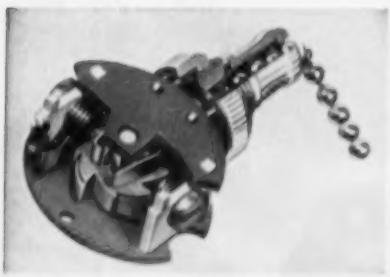
AFFILIATES: Conco Engineering Works—Domestic Heating Equipment • Conco Building Products Int.—Brick, Tile, Stone

JIB CRANES | ELECTRIC HOISTS | CHAIN HOISTS AND TROLLEYS | HAND GEARED CRANES | CRANE ASSEMBLIES



Enlargement showing the contact springs at the "heart" of one model of the Levolier® switch mechanism. Levolier switches are used in industrial and commercial lighting, in heavy-duty industrial sockets, in appliances, fixtures, etc.

The Anaconda alloy tailored for this punishing service actually costs less



Cutaway of Levolier Switch No. 41 shown approximately actual size.

THE PROBLEM: The McGill Manufacturing Company, Inc., Valparaiso, Indiana, was interested in a desirable substitute for a premium copper alloy used in contact springs for their widely known Levolier switch mechanisms. Unexcelled quality had to be maintained with a new alloy that would help hold prices against rising costs. As these switches are designed for long service and heavy-duty industrial service, the spring material has to be tough and durable.

THE SOLUTION: In 1952, McGill discussed the problem of an alternate spring material with a metallurgical engineer from The American Brass Company. After an analysis of the requirements, a special Anaconda alloy was offered—Ambronze-422, rolled to spring temper.

Samples were prepared and tested by McGill and Underwriters' Laboratories. The material performed satisfactorily in standard tests—current carrying capacity, 6 amps at 125 volts d.c.—readily exceeded the requirements of 75,000 cycles, or 150,000 individual operations.

In production, the new Anaconda alloy also performed satisfactorily. It was necessary to make only one minor die-forming change. McGill received a desirable saving in material costs—product quality remained high—and the material was available as needed to maintain production.

FREE TECHNICAL SERVICE: This is another example of the Anaconda technical service available to metal users. Sometimes a new alloy is required—other times a variation of a standard alloy will do the job. The Technical Department of The American Brass Company, through its day-to-day work with a wide variety of metal problems, offers a tremendous breadth of experience, which is at your disposal. See your American Brass Company representative or write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario. 5866

ANACONDA® **COPPER AND COPPER ALLOYS**

STEEL

October 8, 1956

Market Outlook

STEEL INGOT production is at the highest level in history. The estimated national ingot rate last week rose 1 point to 101.5 per cent of capacity. For the first time, output attained a weekly volume of 2.5 million tons.

Steel demand is heavy, but caution dominates buying. Users are covering requirements more leisurely and conservatively than had been anticipated.

STILL STRONG— Above-capacity steelmaking has been achieved despite sluggishness in certain areas of demand, particularly automotive.

Buyers, in general, are just not pushing the market like they were a year ago. But steelmakers see no cause for concern, viewing the more conservative buying as providing the basis for a much sounder market than did the overbuying in other periods of tight steel supply.

AUTOS HOLD KEY— As the largest consuming classification, autos could strengthen over-all demand in the months ahead. So far, automotive orders for fourth quarter have been somewhat disappointing. Last week, however, Chicago steel mills said auto builders were taking full steel quotas, and were asking for more.

Auto demands will spurt when 1957 assemblies get into full swing. Output was only 40,942 units in the latest week of record, up from the preceding week's 35,654. Resumption by Dodge and Plymouth largely accounted for the rise. Ford and Chevrolet new model runs are moving ahead. Buick and Oldsmobile resume at mid-month.

INVENTORY BALANCE— Consumer stocks, it is reported, are in better balance than they were. As a result, inquiry is falling short of expectations. In some lines, such as appliances and farm implements, buying is lagging, with stocks apparently adequate for current curtailed production schedules. Railroads are taking their full quotas, and in some instances, seeking more. Shipbuilders' needs are rising.

SUPPLIES MIXED— Easier supply prevails in some products, though certain mills consider themselves booked full for the rest of this year in all products, with the possible exception of galvanized sheets.

Cold-rolled sheets are available in larger tonnage for December shipment. Galvanized sheets are slower seasonally. Low silicon sheets can be had for delivery this quarter. The same is true of enameling stock and stainless sheets.

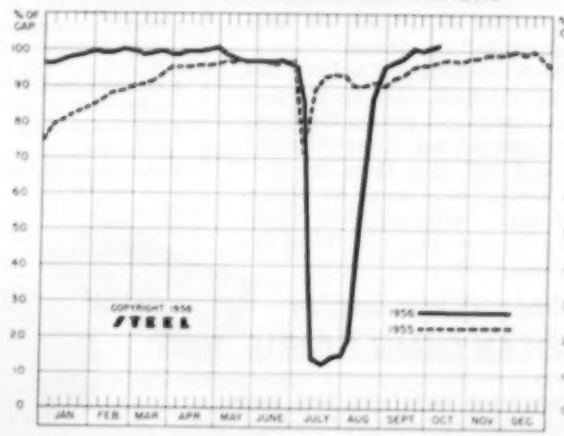
TIGHT SUPPLY ITEMS— The stringency in hot-rolled sheets continues, though some tonnage can be had for December delivery. There is no letup in demand for plates and shapes. The outlook for plates, in fact, is for even greater stringency in the weeks ahead.

No improvement in tight structural steel supply is anticipated for months.

SCRAP DECLINES— Despite heavy consumption and prospects for continued strong demand, downward adjustments are being made in scrap prices. STEEL's composite on the steelmaking grades declined to $57 last week. Two weeks ago, this index stood at $59.67, an all-time high.

Mill prices on merchant wire products were revised downward $3 to $5 a ton by U.S. Steel Corp., effective Oct. 3. STEEL's finished products composite holds at $137.75.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Oct. 7	Change	Same Week 1955	Same Week 1954
Pittsburgh	101.5	0*	101	74.5
Chicago	101	— 0.5	96.5	72
Mid-Atlantic	100.5	+ 1	94.5	63
Youngstown	101	— 1	100	60
Wheeling	104	+ 3	97.5	86.5
Cleveland	105.5	— 0.5*	100.5	77.5
Buffalo	107.5	0	105	68
Birmingham	95.5	— 2	97.5	74
New England	75	— 16	89	52
Cincinnati	91.5	+ 5.5	89.5	66
St. Louis	100	+ 3.5	98.5	75.5
Detroit	101	+ 3	98	76
Western	100	+ 1	96	87
National Rate	101.5	+ 1	97	71

INGOT PRODUCTION‡

	Week Ended Oct. 7	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	155.3†	155.8	151.2	145.3
NET TONS (In thousands)	2,495†	2,502	2,429	2,334

*Change from preceding week's revised rate.
†Estimated. ‡Amer. Iron & Steel Institute.
Weekly capacity (net tons): 2,461,893 in 1956; 2,413,278 in 1955; 2,384,549 in 1954.

Metalworking Outlook—p. 55

Technical Outlook—p. 93

an ACCO product

Acco Registered* Sling Chains

NEW!
Shaped Section Master Link
Holds its form under loads up to 18% greater.
NEW!
Accoloy X-Weld 125 Chain
Welds as strong or stronger than alloy material. Welded area 2¼ times conventional size area.

New X-weld Chains and New Master Links make ACCO *Registered* Sling Chains better, safer than ever!

• Now, you get even better quality, greater strength and an extra bonus of added safety when you buy ACCO *Registered* Sling Chains. For these famous slings embody two exclusive major improvements.

First, they are made with ACCO's great new Accoloy X-weld 125 Chain, hailed as the greatest triumph in chain manufacture since the advent of electrically welded chain. These chains have *unequalled strength at the welds*, and do not kink, thanks to the full alloy strength lugs and king-size welded areas.

Second, these slings incorporate ACCO's new Shaped Section Master Link which, though weighing no more than the standard round section link, holds its form under loads up to 18% greater.

ACCO *Registered* Sling Chains—the standard by which all other sling chains are judged—are on all counts the finest sling chains you can buy. They will serve you long and well. Buy them the next time you are in the market for slings. Call your ACCO *Registered* Sling Chain Distributor for details—or write to our nearest District Office.

WHAT "ACCO REGISTERED" MEANS

1. The best material
2. Unit safety factor (on bodies, rings, links, hooks)
3. Proof test of complete sling to twice the working load limit
4. Actual field service test of each design
5. Metal identification ring on each sling
6. Signed Registry Certificate with each sling

plus Rings Links Hooks

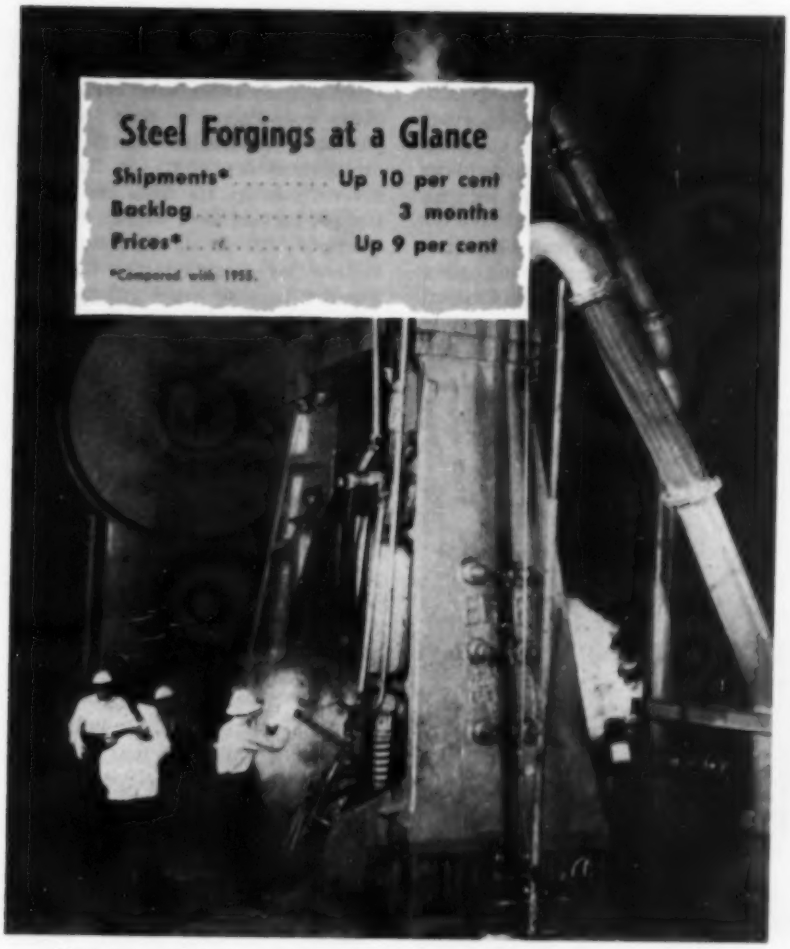
ACCO

*Trade Mark Registered

American Chain Division

AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.



Here's one of two new 50,000-lb hammers installed by Kropp Forge Co.

Good Year for Drop Forgers

STEEL forgers will hammer out their second highest tonnage this year.

Their fortunes are following the nation's over-all business patterns: Strong markets in machine tools and capital equipment, aircraft and military, and construction equipment. Though weak all summer, the auto market is showing signs of picking up.

Going Up—First six-month figures from the Department of Commerce show shipments running at the rate of nearly 2 million tons annually, compared with 1.7 million in 1955. With an expected 15 per cent increase in fourth quarter activity, the forging industry total for this year could top 2.1 million tons, second only to 1952's record 2.9 million.

If you're a buyer of forgings, you'll have difficulty placing orders for fourth quarter delivery if you haven't already done so. Three months is the average backlog, but some companies like Edgewater Steel Co., Oakmont, Pa., are booked solid into next year, and backlogs are still rising.

Prices have gone up 8 to 10 per cent as a result of the steel and labor cost boosts.

Detroit Troubles — Most of the soft spots in the industry appear to be in and around Detroit. Auto orders are slow coming in, but are expected to rise rapidly within the next three weeks. One Detroit firm reports business down 30 per cent from last year's—auto and agricultural equipment account for most of his business. One major complaint: Too much pressure from the auto companies on costs keeps profits too thin. Another factor few like to admit: Competition from shell molding is cutting into some of the conventional forging business.

Get away from the Detroit area and into more industrially diversified locations and those complaints fade. "We try to maintain our operations so that no one segment amounts to over 20 per cent of our business," says Nelson Cornell, vice president of Cornell Forge Co., Chicago. His comment is typical in the Chicago area. Farm equipment business, which is slow currently, is having only minor impact on most midwest forgers who have made an effort to keep diversified.

Aircraft Up—Firms holding aircraft contracts, particularly those working with high strength, high temperature alloys, are reporting business 20 to 50 per cent ahead of 1955 levels. Kropp Forge Co., Chicago, whose business is up 50 per cent, has 65 per cent of its volume going into military and commercial aircraft building. A Pittsburgh forger reports seven-day-a-week operations and six-month backlogs in aircraft and steel orders.

Two problems facing forgers are voiced by Herbert White, president of Cleveland Hardware & Forging Co.: Steel supply and skilled help. Those who did not stockpile steel before the strike are faced with having two months cut off the production allotment for the fourth quarter. Good hammermen can earn $25 to $30 daily, but skilled men are still hard to find.

You don't find too much expansion going on in the forging industry. Kropp Forge's $6-million program in which it installed two 50,000-lb drop forge hammers and six lithium controlled atmosphere furnaces is one exception. But you do find substantial modernization going on. Steel Improvement & Forge Co., Cleveland, says it's necessary to get competitive and to improve quality.

Steel Bars . . .

Bar Prices, Page 145

Hot carbon bar order books are pretty well filled for the fourth quarter. The chief reason is that only about six weeks' output in the period will be available to

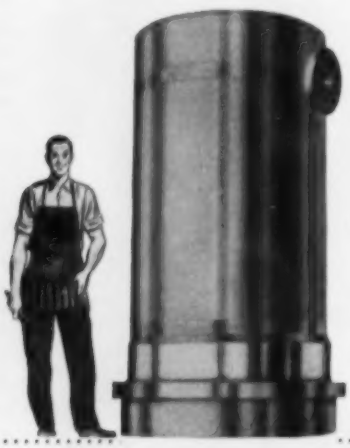
apply against new orders. Mills blanked out about a month-and-a-half of production to care for the carry-over from the third quarter, resulting from the loss of tonnage during the steel strike last summer. Heavier flats and larger rounds are the most extended.

Automotive demand, described as fair, is being watched closely. The motor car builders are entering fourth quarter orders cautiously on mill books. But the volume of auto orders is proportionately better than it was in the second and third quarters. The car builders didn't take their complete mill allotments in those periods.

Sluggish demand from farm implement manufacturers is reported. Minneapolis-Moline Co. is shutting down its Minneapolis tractor plant for two months. It cites lagging sales of farm machinery.

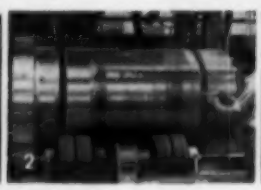
Cold-finished bars can be placed for December shipment. Common sizes and grades can be obtained by converters even earlier. Alloy bar demand is bolstered by military inquiry, some for this quarter.

Need Large Hydraulic Cylinders?



BUILT TO REQUIRED SIZES AND TOLERANCES BY

TITUSVILLE FORGE



Hydraulic cylinders combining the advantages of thoroughly hot worked steel and clean automatic welding are being furnished by Titusville. Such cylinders insure the user of better physical characteristics (hollow forged shell and flanged sections together with upset forged top or dome sections), freedom from leakage under pressure because of porosity and the complete elimination of costly repairs or rejections. Fabrication is shown in photos above.

1. Hollow forging for shell section being hot worked on mandrel.
2. Hollow and upset forgings assembled for automatic welding.
3. Complete welded cylinder being rough turned in 80" engine lathe.

Let Titusville Forge build your hydraulic cylinders—to your most exacting requirements.

Struthers Wells

STRUTHERS WELLS CORPORATION

TITUSVILLE FORGE DIVISION

TITUSVILLE, PA.

PLANTS AT TITUSVILLE, PA., and WARREN, PA.

Offices in Principal Cities

Tin Plate . . .

Tin Plate Prices, Page 147

With canmakers and other tin plate consumers seeking to replenish inventories that were pretty well depleted over the last several months, tin mills are pushing production at a capacity pace.

Prices will go up $2 a ton, effective Nov. 1, applying on tonnage for the ensuing six-month period.

Republic Steel Corp., Cleveland, advanced the price of electrotin $9 a ton, effective Sept. 28. The base price for the 0.25 lb grade, 22-27 gage, is $7.425 per 100 lb.

Tin can price increases average between 3 and 4 per cent. National Can Corp. has announced an increase of about 4 per cent, effective in November. American Can Co. and Continental Can Co. are expected to take similar action.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 146 & 147

It looks like the sheet mills will be booked full this quarter. But failure of the automotive industry to specify heavily against fourth quarter set-asides, notably cold rolled, injects a note of uncertainty.

More cold-rolled tonnage is being offered for December shipment than had been originally planned. One large midwestern producer is actively pushing for orders in the East for the first time in many months. This company has tonnage to spare for December shipment. A Pittsburgh area warehouseman says he has no trouble getting cold rolled for November delivery. He's of the opinion it will be in relatively easy supply until mid-first quarter next year.

The lag in demand also is noted in galvanized sheets and sheet specialties. Low silicon sheets can be had for shipment this year against new orders; also enameling stock and stainless sheets and strip. Stringency continues in hot-rolled sheets, but some tonnage is still available for shipment in December.

The mills are urging auto buyers to take as much tonnage as possible this quarter. They point out that delay in covering needs will push too much demand into the first quarter of next year. This will mean widespread shortages at

a time when the new 1957 model cars should be rolling from assembly lines in volume.

In the main, the sheetmakers think they will be able to dispose of their entire production even though auto requirements should prove disappointing. But the wish may be father to the thought. Requirements from some other consuming directions, appliances for instance, may not be all the sheet mills would like.

Last week, two appliance makers, Westinghouse and Crosley, were scheduling layoffs. Westinghouse was reported seeking to balance inventories at its Mansfield, O., works where it manufactures ranges, laundry equipment, water heaters and electric housewares. Crosley is ending 1956 refrigerator production at its Richmond, Ind., plant on Oct. 7.

Tubular Goods . . .

Tubular Goods Prices, Page 149

Pipe mills are booked up solid on seamless and buttweld pipe for the fourth quarter. Jobbers are taking their full allotments for the period, and strong demand continues to come in on building account. Mills could be booked even farther ahead if they would accept orders running into first quarter of next year.

Buttweld pipe order books for the fourth quarter are filling more rapidly than third quarter books did. Deliveries are said to be extended—in the neighborhood of 90 days at St. Louis.

There wasn't as much tonnage available for fourth quarter orders as there was for third quarter. Reason: Pipe mills had to blank out a substantial portion of production this quarter to care for carry-over orders from third quarter resulting from the loss of tonnage during the steel strike. Some of the pipe mills lost up to six weeks' output, figuring down time during the strike and the time required to get back into production after the settlement was reached.

Line pipe and oil country goods are sold out many months ahead. Some of the mills are booked up through 1958 on line pipe.

New inquiries for cast iron pipe are reported coming out in the Pacific Northwest.

Plates . . .

Plate Prices, Page 145

Platemakers are in receipt of far more inquiry than they can handle, with ship requirements building up rapidly and augmenting the volume of rated work the mills are receiving. As the lead time on this rated work is 90 days, mills opened their books Oct. 1 for January shipments.

Pressure for plates is strong for tanks, fabricated pipe, heavy industrial equipment, building construction and freight car building, although, significantly, the Pennsylvania Railroad has pushed back some of its fourth quarter requirements to the first quarter of 1957. One factor in this decision is a reported shortage of car wheels.

A slight improvement in supplies of light gage plates, under 3/16-in., is coming from the sheet-strip mills. Car builders are getting first call on this tonnage. Small tank shops (including weldments) are not getting much more tonnage.

No easing in tight supply condi-

Install Thomas Flexible Couplings

First cost is only cost when you buy Thomas Flexible Couplings . . . because Thomas Flexible Couplings are correctly engineered, have no wearing parts . . . need no lubrication . . . eliminate future maintenance costs. Even more, Thomas all-metal couplings can be inspected while running—ending inspection shut-downs!

For all practical purposes, properly installed and operated within rated conditions, Thomas Flexible Couplings will last forever.

NO LUBRICATION . . .
NO MAINTENANCE . . .
There Are No Wearing Parts

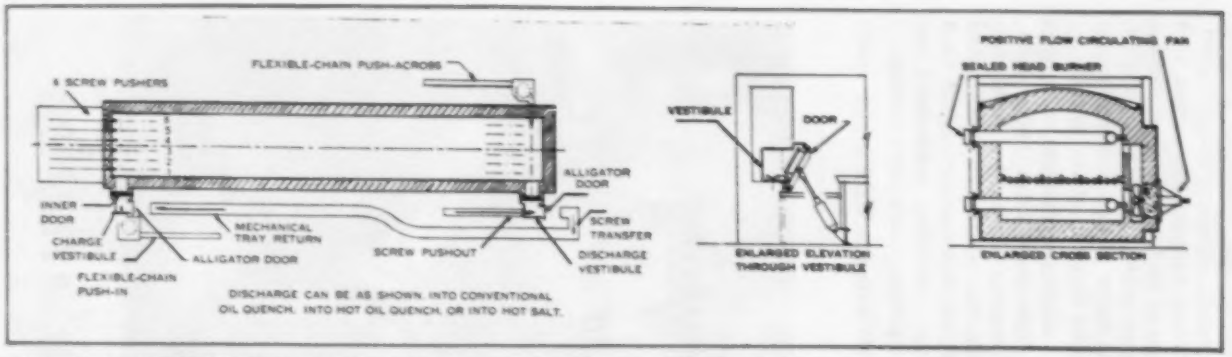
Under load and misalignment, only Thomas Flexible Couplings offer all these advantages:

1. Freedom from backlash – torsional rigidity
2. Free end float
3. Smooth, continuous drive with constant rotational velocity
4. Visual inspection while operating
5. Original balance for life

Write for Engineering Catalog 51A

THOMAS
FLEXIBLE COUPLING CO.
WARREN, PA.

LET'S TALK THE LATEST IN FURNACE DESIGN



Visualize six rows of stock—each row may be of a *different* size and shaped part and may move at a *different* rate of speed through the furnace. *That's real versatility!*

This is the nutshell story of a new Holcroft design. Here are more facts:

HEATING—Sealed head radiant tube burners heat the installation. Air and fuel are metered and progressively mixed as they pass through the tubes providing maximum efficiency at all rates of heating. A positive flow circulating fan assures even distribution of heat and atmosphere around the work.

MATERIAL MOVEMENT—Work trays push each other over silicon carbide rails. Ball bearing type screw pushers are used. An unusual flexible chain push in and push across saves valuable space and permits the use of smaller doors (less heat loss, less purging gas).

OTHER FEATURES—A safety-designed alligator door is air tight when closed, opens upon gas or power failure. Used with the Lo-Dew gas generator, a wide variety of processing (carbo nitriding, carburizing, clean hardening, carbon restoration, etc.) can be handled.

• • •

If you run a mixed production schedule or "all alike" parts—you'll do best to look carefully at what Holcroft can do for you. Better do it right now. Just write!

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PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

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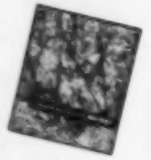
BLAZING THE HEAT TREAT TRAIL WITH HOLCROFT



tions is seen until well through next year, if then.

The one possibility for supply relief rests on the outside chance that strip-plate may be in better supply as the months pass. If cold-rolled sheet demand fails to come up to expectations, more continuous mill plate tonnage may become available.

Midwest fabricators' deliveries were set back about two months by the steel strike. While the mills have restored shipments to the rate that prevailed prior to the work stoppage, little lost ground can be regained under present conditions.

Warehouse . . .

Warehouse Prices, Page 150

Steel sales of warehouses are increasing this month. They would be even larger were distributors' inventories sufficient to permit acceptance of all inquiries. Structural and plates continue in extremely tight supply at the mill level and are moving out of distributors' hands as fast as they are received.

Premium-priced offerings of structurals and plates continue to be made. Consumers are displaying a little more resistance to the high prices quoted on this material.

The flat-rolled products, including galvanized sheets, are readily available from warehouses. Sales of hot-rolled sheets exceed those of cold rolled. But cold rolled may tighten.

Hot-rolled bar stocks have improved in recent weeks, but some size deficiencies are noted. They are caused by mill rolling cycles which run 60 days or longer. Reinforcing bars continue in strong demand.

Structural Shapes . . .

Structural Shape Prices, Page 146

Structural fabricating shops in the East are turning away new inquires. They are sold up to prospective steel allotments well into next year, with delivery promises rarely under six to eight months.

Shipments of steel to eastern shops are slightly heavier on old orders. Some increase in tonnage is possible at the first of the year from increased capacity. However,

heavy demand and large mill backlogs preclude any substantial improvement in structural supply in the near future.

Bridge inquiry is heavier. Estimates are being made on 10,350 tons, mostly I-beams, for New York state. Bids close at Albany Oct. 18.

At least one large shape mill has not opened its books for December tonnage. Most makers estimate they will not have more than four to five weeks' capacity to devote to new orders this quarter, and the outlook is for a continued shortage for some months.

In turn, this prospect is causing fabricators to move cautiously in accepting new tonnage.

The first steel columns for the world's largest rivetless skyscraper were set in place Sept. 24 at 666 Fifth Ave., New York, by the Tishman Realty & Construction Co. Inc., owner-builder. High tensile bolts will be used.

Wire . . .

Wire Prices, Pages 147 & 148

American Steel & Wire, Columbia-Geneva Steel and Tennessee Coal & Iron divisions of the U.S. Steel Corp. revised mill prices on major merchant wire products, effective Oct. 3.

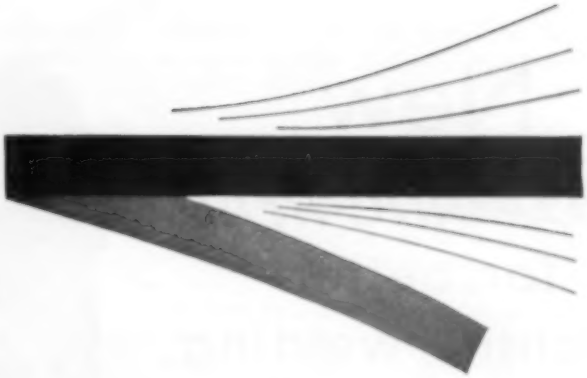
Mill base prices for the general trade, other than jobbers, are reduced $3 to $5 a ton on such products as nails and staples, barbed wire, and fence. This makes mill price bases for these customers the same as those in effect for jobbers.

Present mixed carload prices have been withdrawn, and extras for quantities of less than stated minimums are established for mill shipments of merchant wire products.

Effective Oct. 1, the Youngstown Sheet & Tube Co., Youngstown, increased prices on all grades of high carbon rope wire $4 a ton. Improved plow grade is quoted at $11.80, and plow and mild plow grades, $11.55.

Demand for automotive upholstery wire has picked up in the Midwest.

Wire specialties orders have filled most November mill schedules. But there are limited openings, with more producers caught up on delinquent tonnage. Deliveries are near normal on an increasing volume of new orders.



25,000 psi yield strength in aluminum castings without heat treatment

Federated's Tenzaloy, self-aging aluminum alloy, has an unusually desirable combination of properties, including exceptionally high yield strength, which is the best measure of ability to take punishment without failure.

Here are typical properties of Tenzaloy castings aged 10-14 days at room temperature:

Yield Strength, psi (.02% offset)	**25,000**
Tensile Strength, psi	**35,000**
Brinell Hardness Number	**74**

Tenzaloy has other unique properties that help make it the most widely used of all high-strength, self-aging aluminum alloys; it takes a fine anodized finish, it has excellent machinability, it has superior corrosion resistance, and it can be brazed by standard techniques.

Ask your Federated salesman to tell you how and where foundries are successfully and profitably using Tenzaloy. Or write us directly for a complete pamphlet on the alloy and its properties.

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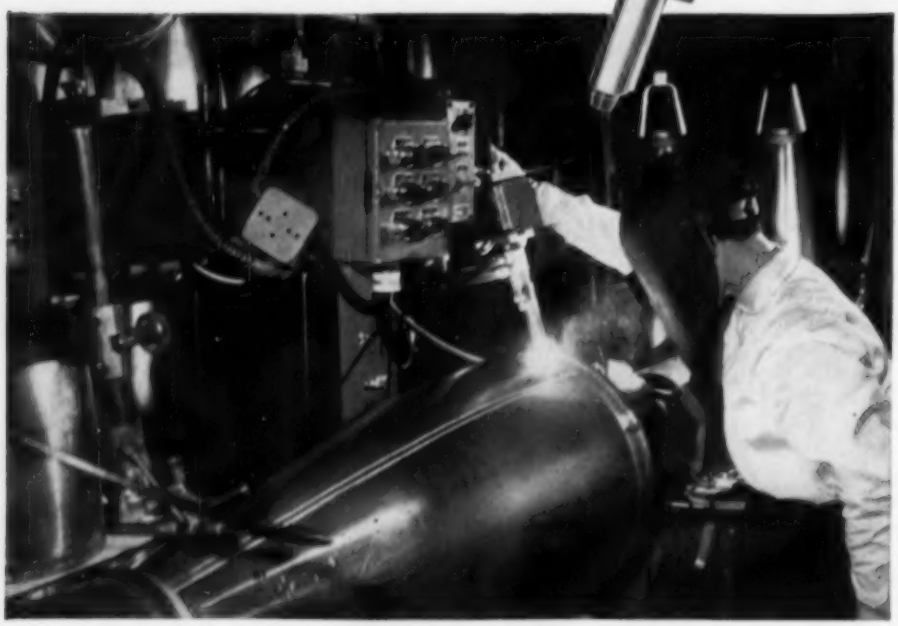
New AIRCOMATIC® HEAD for better machine welding



New AMH-B Head welding cylindrical containers on a high production basis. All components of this Aircomatic package — power supply, inert gases, and Aircomatic welding wire — are available from Airco.

The new improved Airco AMH-B Aircomatic Head has been developed for the fabrication of ferrous and nonferrous metals on a high production basis. Used in conjunction with constant arc voltage power supply, this unit provides automatic control of the arc voltage. Standard shielding gases—argon, helium, mixtures (AG75) and CO_2 — are used. Advantages of the AMH-B include: two speed ranges, up to 900 inches per minute high range, and up to 600 inches per minute low range; all types of Aircomatic welding wire, from .030" to 3/32" diameters, can be used.

Wire is fed at a constant speed by an adjustable speed motor. Easy adjustment of the head allows it to be used vertically or horizontally.

For handling most applications the basic package consists of the Aircomatic unit, a machine barrel and a wire guide component kit. The basic Aircomatic unit includes the head, main control panel and remote control operator's station. For complete information write Airco direct.

AT THE FRONTIERS OF welding PROGRESS YOU'LL FIND . . .

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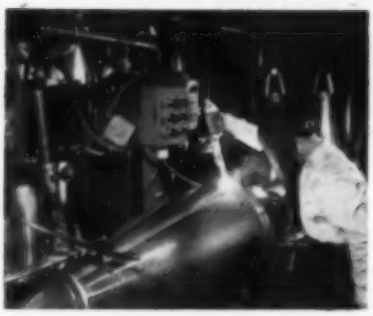
In Canada — Air Reduction Canada Limited

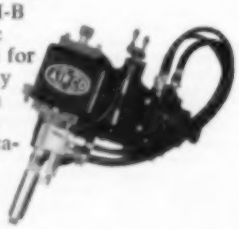
Products of the divisions of Air Reduction Company, Incorporated, include: **AIRCO** — industrial gases, welding and cutting equipment, and acetylenic chemicals • **PUBECO** — carbon dioxide, liquid-solid ("DRY-ICE") • **OHIO** — medical gases and hospital equipment • **NATIONAL CARBIDE** — pipeline acetylene and calcium carbide • **COLTON** — polyvinyl acetates, alcohols, and other synthetic resins.



Note these outstanding advantages of the new AMH-B

- Accommodates wide range of metal thicknesses — take fine wires (.030") for thin gauges, and up to 3/32" for normal gauges.
- Versatility — through availability of 3 machine barrels with duty ratings of 350, 500 and 600 amperes.
- Extreme compactness contributes to ease of installation, setting up, and servicing.
- Designed so that accessory equipment may be connected easily, quickly.
- Easy to mount: only standard 1½" steel pipe is required.
- Can be used with argon, helium, mixtures (AG 75) and CO_2 gases.
- Simplified design means easier maintenance and longer life.

You'll find the new AMH-B Aircomatic Head ideal for high quality welding on production type applications. For complete details



WRITE DIRECT TO AIRCO

Automotive requirements are moderately heavier, including valve spring wire, but buying for new model needs had not reached the expected peak. Spring and heading wire, also most specialties, are being booked for December with buying predicated on estimated consumption. There is less drive for inventory build-up than was the case last June.

Buying is light in New England in heddle, card and the miscellaneous textile wire items. Rod selling is held to allotments and most users seek more tonnage than they are receiving.

Pig Iron . . . .

Pig Iron Prices, Page 130

Releases for pig iron shipments are not reaching sellers as quickly as had been anticipated. The conclusion: Inventory adjustments are still being made this month. It is becoming increasingly apparent that foundries stocked more iron before the steel strike than was generally believed. Another month may be required to reduce inventories to normal proportions.

Automotive foundries are pushing schedules up, with the big bulge still to come for most melters.

Other producers of ferromanganese have followed the move of Electro Metallurgical Co. in advancing ferromanganese prices. E. J. Lavino & Co., Philadelphia, advanced standard ferromanganese (Mn 74-76 per cent) to $235, Sheridan, Pa., furnace, effective as of Sept. 28. U.S. Steel Corp. advanced its prices to the same level at its producing point on Oct. 1. Anaconda Co. advanced its base price for ferromanganese (Mn 79-81 per cent) to $243 per net ton, f.o.b. Anaconda or Great Falls, Mont., effective Oct. 1.

Iron Ore . . .

Iron Ore Prices, Page 151

Shipments of iron ore on the Great Lakes totaled 2,953,777 gross tons in the week ended Oct. 1, reports the Lake Superior Iron Ore Association. This compares with 2,802,020 tons in the like week a year ago.

Cumulative shipments to Oct. 1 this year were 54,660,075 tons, against 67,735,806 in the like period of 1955. The lag behind last year is due to the loss of shipments during the summer steel and shipping strikes.

Youngstown Sheet & Tube Co., Youngstown, expects it will take in an estimated 100,000 tons of Labrador iron ore this year by way of a recently opened water-rail route.

The ore moves by vessel from Seven Islands, on the Gulf of St. Lawrence, to Contrecoeur, on the St. Lawrence river, 25 miles downstream from Montreal, Que. There it is loaded into railroad cars and moved via the Canadian National and the New York Central railroads to Youngstown, a haul of about 600 miles. About 70 cars are loaded daily, equal to 4200 tons.

Considerable Labrador ore is moving in "canaler" type vessels via the small St. Lawrence locks to Lake Erie ports. About 2 million tons are expected this year.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 151

Coke sellers in the Chicago market are receiving good shipment releases from foundries this month, indicating that production of castings is definitely on the upturn. October foundry coke sales will outrun September's by a good margin. November sales are expected to pull still farther ahead. Being bulky, coke wasn't stocked ahead of the steel strike as was pig iron.

Rails, Cars . . .

Track Material Prices, Page 148

Coal mines in the Pittsburgh area are losing production because of a shortage of open-top freight cars. Railroads say the stringency in hoppers should be over by mid-November, but shippers are doubtful.

The railroads are pushing car rebuilding programs. The Baltimore & Ohio, for example, plans to rebuild 1000 hoppers at a cost of about $5 million. It is said to have about 2800 hoppers, 6 per cent of its fleet, awaiting repairs, and that rebuilt cars will begin coming from the car shops this month at the rate of 150 monthly.

Shippers, including the coal trade, claim the carriers haven't enough cars to meet expanded requirements.

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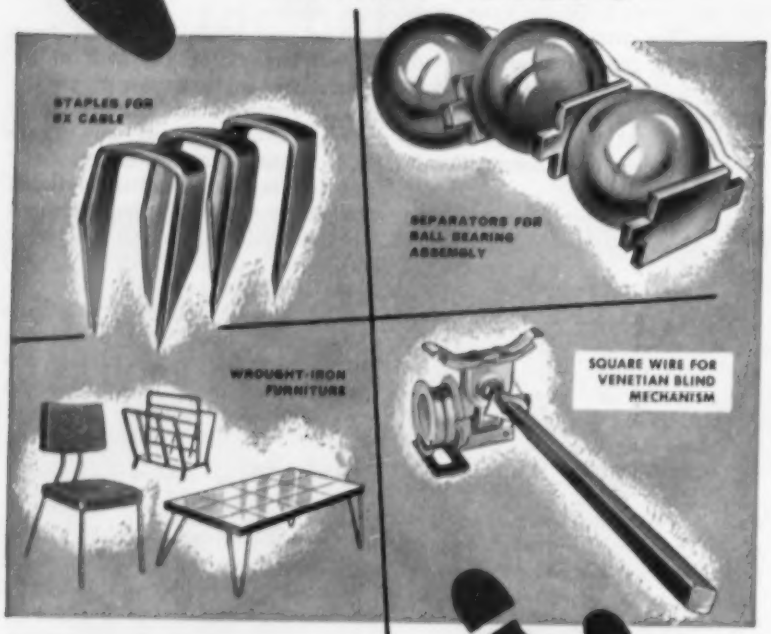
FLAT & SHAPED WIRE SAVES STEPS


STAPLES FOR BX CABLE
SEPARATORS FOR BALL BEARING ASSEMBLY
WROUGHT-IRON FURNITURE
SQUARE WIRE FOR VENETIAN BLIND MECHANISM

...cuts corners in production

● STANDARD AND SPECIAL SHAPES IN MANY SIZES

Shaped wire often saves steps by eliminating forging, stamping, and rolling operations—giving you a ready-made molding, product trim, or component that requires a minimum of further fabrication. Saves metal, too. From Continental you can obtain many cost-cutting wire shapes—V-shaped, oval, square, rectangular, triangular, keystone-shaped, and others.

● IN A WIDE RANGE OF TEMPERS AND FINISHES

Practically any temper, finish, or analysis in low carbon and medium low carbon steels can be specified to give you the *right* wire for the job—including #3 finish wire for electroplating.

● PRECISE MANUFACTURING CONTROL

Continental Special Shaped Wire is made under strict quality control to assure uniformity. You get a better product and fewer rejects—qualities that Continental wire customers especially appreciate. Let us help *you* save production steps, too. Write for the complete story of Continental wire today.

Wire Specialists for over Half a Century

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STEEL CORPORATION • KOKOMO, INDIANA

PRODUCERS OF Manufacturers' Wire in many sizes, shapes, tempers, and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, and special wire. Also, Coated Steel Sheets, Nails, Continental Chain Link Fence, and other products.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

7200 tons, India Point generating station, Consolidated Edison Co., Buchanon, N. Y., to Ingalls Iron Works, Birmingham.

4620 tons, city and municipal court building, New York (Manhattan) to Lehigh Structural Steel Co., Allentown, Pa.; Slattery Contracting Co. Inc., New York, general contractor.

4500 tons, trestle and stockhouse, Ohio Works, U. S. Steel Corp., Youngstown, to American Bridge Division, U.S. Steel Corp., Pittsburgh.

4294 tons, state Manahawkin bridge, Ocean county, N. J., through Conduit & Foundation Corp., to New York Shipbuilding Corp., Camden, N. J.

2000 tons, pulp mill, Toledo, Oreg., for Georgia-Pacific Co. to the Isaacson Iron Works, Seattle.

1250 tons, junior high school, No. 117, New York, to Grand Iron Works, Bronx, New York; Psaty & Firhman Construction Co., New York, general contractor.

900 tons, nuclear engineering laboratory, Middletown, Conn., to Grand Iron Works, Bronx, N. Y., direct to Corps of Engineers, Boston.

330 tons, research laboratory addition, R. J. Reynolds Tobacco Co., Winston-Salem, N.C., to Salem Steel Co., Winston-Salem; George W. Kane, Greensboro, N.C., general contractor; 80 tons, reinforcing bars, to Easterly & Murrow, Charlotte, N.C.

430 tons, maintenance hangar, Naval air station, Brunswick, Ga., to Aetna Steel Co., Jacksonville, Fla.; A. B. Newton & Co., Vidalia, Ga., general contractor; 75 tons, reinforcing bars, Atlantic Steel Co., Atlanta, Ga.

390 tons, state highway bridge FGRC-56-70, Suffolk county, New York, to Bethlehem Steel Co., Bethlehem, Pa.; Horn Construction Co., New York, general contractor.

380 tons manufacturing building, Johns Manville Co., Natchez, Miss., to Allied Structural Steel Co., Chicago.

250 tons, junior high school No. 52, New York, to Bethlehem Fabricators Inc.

STRUCTURAL STEEL PENDING

9500 tons, steel sheet piling, Barkley Dam, Cumberland river, Kentucky; bids direct, Corps of Engineers, Nashville, Tenn.

3835 tons, 16-span viaduct and seven-span elevated ramp, New York state thruway, Niagara section N4, Buffalo; bids Oct. 18, Albany, N. Y.

2880 tons, three highway, I-beam, and one railroad, I-beam and girder, grade separations, New York state thruway, New England section NE5, Boston Post road to Fox Island road, Westchester county, New York; bids Oct. 18, Albany, N. Y.

2000 tons, structural steel gates and bridge, lock and dam No. 41, Ohio river, Louisville; bids early 1957, Corps of Engineers, Louisville; also 2000 tons, reinforcing bars.

1440 tons, six highway and one railroad grade separation, Oswego boulevard, Syracuse, N. Y., I-beams; bids Oct. 18, Albany, N. Y.

1800 tons, two-place painting garage, Boeing flight center, Moses Lake, Wash.; Judson, Pacific, Murphy, San Francisco, bidding $865,000; reported one of four firms meeting specifications.

930 tons, four highway and one railroad grade separation, New York state thruway, Niagara section N6, Buffalo, I-beams, bids Oct. 18, Albany, N. Y.

800 tons, also 5500 ft of H-piling, third unit Eagle Gorge railroad replacement project; bids to U. S. Engineer, Seattle, Oct. 29.

610 tons, three highway and one railroad grade crossings, New York state thruway, Niagara section N6, Pt. 1 Buffalo, I-beams; bids Oct. 18, Albany, N. Y.

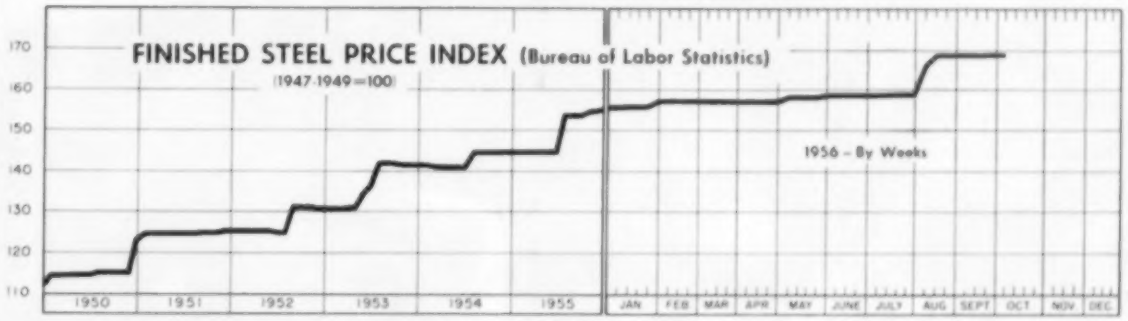
315 tons, two bridges, Waterbury, Conn.; Stanley J. Ziobro Inc., East Rutherford, low, also 200 tons of steel piles, and 120 tons of reinforcing bars.

310 tons, two 2-span beam bridges, Naugatuck river, Torrington-Harwinton, Conn.; also 235 tons, steel piles, and 100 tons, reinforcing bars.

235 tons, two highway, rigid frame, and

(*Please turn to page 154*)

Price Indexes and Composites



Oct. 2 1956	Week Ago	Month Ago	Sept. Avg.	Year ago
168.6	168.6	168.6	168.6	154.5

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Oct. 2

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.150
Rails, Light, 40 lb	6.067
Tie Plates	6.025
Axles, Railway	8.950
Wheels, Freight Car, 33 in. (per wheel)	57.50
Plates, Carbon	5.550
Structural Shapes	5.267
Bars, Tool Steel, Carbon (lb)	0.480
Bars, Tool Steel Alloy, Oil Hardening Die (lb)	0.585
Bars, Tool Steel, H. R. Alloy, High Speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.274
Bars, Tool Steel, H.R., Alloy, High Speed W18 Cr 4, V 1 (lb)	1.769
Bars, H.R., Alloy	10.025
Bars, H.R., Stainless, 303 (lb)	0.483
Bars, H.R., Carbon	5.925
Bars, Reinforcing	5.738
Bars, C.F., Carbon	9.610
Bars, C.F., Alloy	13.275
Bars, C.F., Stainless, 302 (lb)	0.508
Sheets, H.R., Carbon	5.688
Sheets, C.R., Carbon	6.639
Sheets, Galvanized	8.220
Sheets, C.R., Stainless, 302 (lb)	0.635
Sheets, Electrical	11.225
Strip, C.R., Carbon	5.843
Strip, C.R., Stainless, 402 (lb)	0.475
Strip, H.R., Carbon	5.900
Pipe, Black, Buttweld (100 ft)	18.278
Pipe, Galv., Buttweld (100 ft)	22.516
Pipe, Line (100 ft)	182.980
Casing, Oil Well, Carbon (100 ft)	175.046
Casing, Oil Well, Alloy (100 ft)	276.870
Tubes, Boiler (100 ft)	45.033
Tubing, Mechanical, Carbon (100 ft)	22.973
Tubing, Mechanical, Stainless, 304 (100 ft)	187.133
Tin Plate, Hot-dipped, 1.25 lb	9.333
Tin Plate, Electrolytic, 0.25 lb	8.033
Black Plate, Canmaking Quality	7.133
Wire, Drawn, Carbon	9.175
Wire, Drawn, Stainless, 430 (lb)	0.630
Bale ties (bundle)	7.213
Nails, Wire, 8d Common	9.368
Wire, Barbed (80-rod spool)	8.412
Woven Wire Fence (20-rod roll)	30.505

STEEL's FINISHED STEEL PRICE INDEX*

	Oct. 3 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	225.71	225.71	225.71	208.97	171.92
Index in cents per lb	6.114	6.114	6.114	5.661	4.657

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT*	$137.75	$137.75	$137.75	$128.14	$106.32
No. 2 Fdry Pig Iron, GT	62.63	62.63	62.63	58.99	52.54
Basic Pig Iron, GT	62.18	62.18	62.18	58.49	52.16
Malleable Pig Iron, GT	63.41	63.41	63.41	59.77	53.27
Steelmaking Scrap, GT	57.00	56.17	56.83	45.33	44.00

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 84; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Oct. 3 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	5.075	5.075	5.075	4.65	3.70
Bars, H.R., Chicago	5.075	5.075	5.075	4.65	3.70
Bars, H.R., deld., Philadelphia	4.93	4.93	4.93	4.90	4.223
Bars, C.F., Pittsburgh	6.85*	6.85*	6.85*	5.90	4.55
Shapes, Std., Pittsburgh	5.00	5.00	5.00	4.60	3.65
Shapes, Std. Chicago	5.00	5.00	5.00	4.60	3.65
Shapes, deld., Philadelphia	5.00	5.00	5.00	4.88	3.918
Plates, Pittsburgh	4.85	4.85	4.85	4.50	3.70
Plates, Chicago	4.85	4.85	4.85	4.50	3.70
Plates, Coatesville, Pa.	5.25	5.25	5.25	4.50	4.15
Plates, Sparrow Point, Md.	4.85	4.85	4.85	4.50	3.70
Plates, Claymont, Del.	5.35	5.35	5.35	4.50	4.15
Sheets, H.R., Pittsburgh	4.675	4.675	4.675	4.325	3.60-3.75
Sheets, H.R., Chicago	4.675	4.675	4.675	4.325	3.60
Sheets, C.R., Pittsburgh	5.75	5.75	5.75	5.325	4.35
Sheets, C.R., Chicago	5.75	5.75	5.75	5.325	4.35
Sheets C.R., Detroit	5.75-5.85	5.75-5.85	5.75-5.85	5.325-5.425	4.55
Sheets, Galv., Pittsburgh	6.30	6.30	6.30	5.85	4.80
Strip, H.R., Pittsburgh	4.675	4.675	4.675	4.325	3.75-4.00
Strip, H.R., Chicago	4.675	4.675	4.675	4.325	3.50
Strip, C.R., Pittsburgh	6.85	6.85	6.85	6.25-6.45	4.65-5.35
Strip, C.R., Chicago	6.85	6.85	6.85	6.35-6.45	4.90
Strip, C.R., Detroit	6.95	6.95	6.95	6.35	4.85-5.60
Wire, Basic, Pittsburgh	7.20	7.20	7.20	6.25	4.85-5.10
Nails, Wire, Pittsburgh	8.35	8.35	8.35	7.60	5.90-6.20
Tin plate (1.50 lb) box, Pitts.	$9.85	$9.85	$9.85	$9.45	$8.70

*Including 0.35c for special quality

SEMIFINISHED STEEL					
Billets forging, Pitts. (NT)	$91.50	$91.50	$91.50	$84.50	$66.00
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	5.80	5.80	5.80	5.025	4.10-4.30

PIG IRON, Gross Ton	Oct. 3 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bessemer, Pitts.	$63.50	$63.50	$63.50	$59.50	$53.00
Basic, Valley	62.50	62.50	62.50	58.50	52.00
Basic, deld. Phila.	66.26	66.26	66.26	59.16	56.61
No. 2 Fdry, Neville Island, Pa.	63.00	63.00	63.00	59.00	52.50
No. 2 Fdry, Chicago	63.00	63.00	63.00	59.00	52.50
No. 2 Fdry, deld. Phila.	66.76	66.76	66.76	59.66	57.11
No. 2 Fdry, Birm.	59.00	59.00	59.00	55.00	48.88
No. 2 Fdry (Birm.) deld. Cin.	66.70	66.70	66.70	62.70	55.49
Malleable, Valley	63.00	63.00	63.00	59.00	52.50
Malleable, Chicago	63.00	63.00	63.00	59.00	52.50
Ferromanganese, Duquesne	235.00†	215.00†	215.00†	190.00†	188.00*

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$56.50	$56.50	$58.50	$44.50	$45.00
No. 1 Heavy Melt, E. Pa.	56.50	58.00	59.00	46.50	43.50
No. 1 Heavy Melt, Chicago	58.00	60.00	59.00	45.00	43.50
No. 1 Heavy Melt, Valley	64.50	65.50	65.50	48.00	45.00
No. 1 Heavy Melt, Cleve.	63.00	63.00	63.00	44.50	44.00
No. 1 Heavy Melt, Buffalo	57.50	57.50	56.50	38.50	44.00
Rails, Rerolling, Chicago	83.00	84.50	83.50	65.50	52.50
No. 1 Cast, Chicago	51.50	53.50	53.50	48.50	49.00

COKE, Net Ton					
Beehive, Furn. Connlsvl.	$14.50	$14.50	$14.50	$13.625	$14.75
Beehive, Fdry, Connlsvl.	17.50	17.50	17.50	16.50	17.50

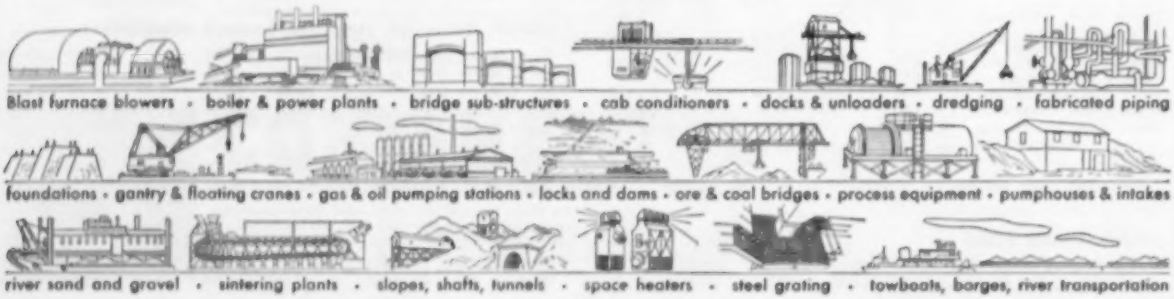
Dravo heaters saved $6,732 per year, also released valuable space for production

Heating costs were high at Ideal Electric and Manufacturing Company's seven-acre plant in Mansfield, Ohio. Thirty-two hand-fired stoves, with fuel bins, used more than 4,000 square feet of floor space and provided anything but uniform heat.

In contrast, only 400 square feet of space was needed when eleven Dravo Counterflo heaters were installed. Result: 3,600 square feet additional floor space for production; $6,732 actual gross savings in one season; constant heat level automatically maintained throughout the plant.

For specific help on space heating or in any of the fields listed below, write to DRAVO CORPORATION, PITTSBURGH 25, PENNSYLVANIA.

DRAVO
CORPORATION


Blast furnace blowers • boiler & power plants • bridge sub-structures • cab conditioners • docks & unloaders • dredging • fabricated piping
foundations • gantry & floating cranes • gas & oil pumping stations • locks and dams • ore & coal bridges • process equipment • pumphouses & intakes
river sand and gravel • sintering plants • slopes, shafts, tunnels • space heaters • steel grating • towboats, barges, river transportation

Steel Prices

Mill prices as reported to STEEL, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key to producers page 146; to footnotes, page 148.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5 ....$70.50

INGOTS, Alloy (NT)

Detroit R7 .....$74.00
Houston 85 .....74.00
Midland,Pa. C18 .....74.00
Munhall,Pa. U5 .....74.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)

Aliquippa,Pa. J5 ....$74.00
Bessemer,Pa. U5 .....74.00
Bridgeport,Conn. N19..79.00
Buffalo R2 .....74.00
Clairton,Pa. U5 .....74.00
Ensley,Ala. T2 .....74.00
Fairfield,Ala. T2 .....74.00
Fontana,Calif. K1 ....83.50
Gary,Ind. U5 .....74.00
Johnstown,Pa. B2 .....74.00
Lackawanna,N.Y. B2..74.00
LoneStar,Tex L6 .....80.00
Munhall,Pa. U5 .....74.00
Pittsburgh J5 .....74.00
S.Chicago,Ill. R2, U5..74.00
S.Duquesne,Pa. U5....74.00
Sterling,Ill. N15 .....74.00
Youngstown R2 .....74.00

Carbon, Forging (NT)

Aliquippa,Pa. J5 ....$91.50
Bessemer,Pa. U5 .....91.50
Bridgeport,Conn. N19 ..96.50
Buffalo R2 .....91.50
Canton,O. R2 .....94.00
Clairton,Pa. U5 .....91.50
Conshohocken,Pa. A3 ..96.50
Ensley,Ala. T2 .....91.50
Fairfield,Ala. T2 .....91.50
Fontana,Calif. K1 ....101.00
Gary,Ind. U5 .....91.50
Geneva,Utah C11 .....91.50
Houston 85 .....96.50
Johnstown,Pa. B2 .....91.50
Lackawanna,N.Y. B2..91.50
LosAngeles B3 .....101.00
Midland,Pa. C18 .....91.50
Munhall,Pa. U5 .....91.50
Pittsburgh J5 .....91.50
Seattle B3 .....105.00
S.Chicago R2, U5, W14 91.50
S.Duquesne,Pa. U5 ....91.50
S.SanFrancisco B3 ..101.00

Alloy, Forging (NT)

Bethlehem,Pa. B2 ..$107.00
Bridgeport,Conn. N19 .107.00
Buffalo R2 .....107.00
Canton,O. R2 .....107.00
Conshohocken,Pa. A3 .114.00
Detroit R7 .....107.00
Fontana,Calif. K1 ....128.00
Gary,Ind. U5 .....107.00
Houston 85 .....112.00
Ind.Harbor,Ind. Y1 ..107.00
Johnstown,Pa. B2 ....107.00
Lackawanna,N.Y. B2 .107.00
LosAngeles B3 .....127.00
Massillon,O. R2 .....107.00
Midland,Pa. C18 ....107.00
Munhall,Pa. U5 .....107.00
S.Chicago R2,U5,W14 .107.00
S.Duquesne,Pa. U5 ..107.00
Struthers,O. Y1 .....107.00
Warren,O. C17 .....107.00

ROUNDS, SEAMLESS TUBE (NT)

Bridgeport,Conn. N19 $116.50
Buffalo R2 .....111.50
Canton,O. R2 .....114.00
Cleveland R2 .....111.50
Gary,Ind. U5 .....111.50
S.Chicago,Ill. R2, W14 111.50
S.Duquesne,Pa. U5 ..111.50

SKELP

Aliquippa,Pa. J5 .....4.725
LoneStar,Tex. L6 ....5.025
Munhall,Pa. U5 .....4.625
SparrowsPoint,Md. B2 .4.625
Warren,O. R2 .....4.625
Youngstown R2, U5 ..4.625

WIRE RODS

AlabamaCity,Ala. R2 ..5.80
Aliquippa,Pa. J5 .....5.80
Alton,Ill. L1 .....6.00
Buffalo W12 .....5.80
Cleveland A7 .....5.80
Donora,Pa. A7 .....5.80
Fairfield,Ala. T2 .....5.80
Houston 85 .....6.05
IndianaHarbor,Ind. Y1 .5.80
Johnstown,Pa. B2 .....5.80
Joliet,Ill. A7 .....5.80
KansasCity,Mo. 86 ....6.05
Kokomo,Ind. C16 .....5.90
LosAngeles B3 .....6.60
Minnequa,Colo. C10 ...6.05
Monessen,Pa. P7 .....5.80
N.Tonawanda,N.Y. R11..5.80
Pittsburg,Calif. C11 ....6.45
Portsmouth,O. P12 ....5.80
Roebling,N.J. R5 .....5.90
S.Chicago,Ill. R2 .....5.80
SparrowsPoint,Md. B2 ..5.90
Sterling,Ill.(1) N15 ....5.80
Sterling,Ill. N15 .....5.90
Struthers,O. Y1 .....5.80
Worcester,Mass. A7 ....6.10

STRUCTURALS

Carbon Steel Std. Shapes

Ala.City,Ala. R2 .....5.00
Aliquippa,Pa. J5 .....5.00
Bessemer,Ala. T2 .....5.00
Bethlehem,Pa. B2 .....5.05
Birmingham C15 .....5.30
Clairton,Pa. U5 .....5.00
Fairfield,Ala. T2 .....5.00
Fontana,Calif. K1 ....5.70
Gary,Ind. U5 .....5.00
Geneva,Utah C11 .....5.00
Houston 85 .....5.10
Ind.Harbor,Ind. I-2 ....5.00
Johnstown,Pa. B2 .....5.05
KansasCity,Mo. 85 ....5.10
Lackawanna,N.Y. B2 ..5.05
LosAngeles B3 .....5.70
Minnequa,Colo. C10 ....5.30
Munhall,Pa. U5 .....5.00
Niles,Calif. P1 .....5.75
Phoenixville,Pa. P4 ....5.85
Portland,Oreg. O4 .....5.80
Seattle B3 .....5.75
S.Chicago,Ill. U5, W14 .5.00
S.SanFrancisco B3 ....5.65
Sterling,Ill. N15 .....5.00
Torrance,Calif. C11 ....5.70
Weirton,W.Va. W6 .....5.00

Wide Flange

Bethlehem,Pa. B2 .....5.05
Clairton,Pa. U5 .....5.00
Fontana,Calif. K1 ....5.85
IndianaHarbor,Ind. I-2..5.00
Lackawanna,N.Y. B2 ..5.05
Munhall,Pa. U5 .....5.00
Phoenixville,Pa. P4 ....5.85
S.Chicago,Ill. U5 .....5.00

Alloy Std. Shapes

Clairton,Pa. U5 .....6.20
Fontana,Calif. K1 ....7.85
Gary,Ind. U5 .....6.20
Houston 85 .....6.30
Munhall,Pa. U5 .....6.20
S.Chicago,Ill. U5 .....6.20

H.S., L.A. Std. Shapes

Aliquippa,Pa. J5 .....7.35
Bessemer,Ala. T2 .....7.35
Bethlehem,Pa. B2 .....7.40
Clairton,Pa. U5 .....7.35
Fairfield,Ala. T2 .....7.35
Fontana,Calif. K1 ....8.05
Gary,Ind. U5 .....7.35
Geneva,Utah C11 .....7.35
Houston 85 .....7.45
Ind.Harbor,Ind. I-2, Y1 7.35
Johnstown,Pa. B2 .....7.40
KansasCity,Mo. 85 ....7.45
Lackawanna,N.Y. B2 ..7.40
LosAngeles B3 .....8.05
Munhall,Pa. U5 .....7.35
Seattle B3 .....8.10
S.Chicago,Ill. U5, W14..7.35
S.SanFrancisco B3 ....8.00
Struthers,O. Y1 .....7.35

H.S., L.A. Wide Flange

Bethlehem,Pa. B2 .....7.40
Ind.Harbor,Ind. I-2 ...7.35
Lackawanna,N.Y. B2 ..7.40
Munhall,Pa. U5 .....7.35
S.Chicago,Ill. U5 .....7.35

PILING

BEARING PILES

Bethlehem,Pa. B2 .....5.05
Lackawanna,N.Y. B2 ...5.05
Munhall,Pa. U5 .....5.00
S.Chicago,Ill. U5 .....5.00

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 ...5.90
Lackawanna,N.Y. B2 ..5.90
Munhall,Pa. U5 .....5.90
S.Chicago,Ill. U5 .....5.90

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2 .....4.85
Aliquippa,Pa. J5 .....4.85
Ashland,Ky. (15) A10..4.85
Bessemer,Ala. T2 .....4.85
Bridgeport,Conn. N19 ..4.75
Clairton,Pa. U5 .....4.85
Claymont,Del. C22 ....5.35
Cleveland J5, R2 .....4.95
Coatesville,Pa. L7 ....5.25
Conshohocken,Pa. A3 ..4.90
Detroit M1 .....4.60
Ecorse,Mich. G5 .....4.95
Fairfield,Ala. T2 .....4.85
Fontana,Calif.(30) K1 .5.55
Gary,Ind. U5 .....4.85
Geneva,Utah C11 .....4.85
GraniteCity,Ill. G4 ....5.05
Harrisburg,Pa. P4 .....5.80
Houston 85 .....4.95
Ind.Harbor,Ind. I-2, Y1 4.85
Johnstown,Pa. B2 .....4.85
Lackawanna,N.Y. B2 ...4.85
LoneStar,Tex. L6 .....5.20
Minnequa,Colo. C10 ....5.70
Munhall,Pa. U5 .....4.85
Newport,Ky. N9 .....4.85
Pittsburgh J5 .....4.85
Riverdale,Ill. A1 .....4.85
Seattle B3 .....5.75
Sharon,Pa. S3 .....4.85
S.Chicago,Ill. U5, W14 ..4.85
SparrowsPoint,Md. B2 ..4.85
Steubenville,O. W10 ...4.85
Warren,O. R2 .....4.85
Weirton,W.Va. W6 .....4.85
Youngstown R2, U5, Y1 4.85

PLATES, Carbon Abras. Resist.

Claymont,Del. C22 ....6.20
Fontana,Calif. K1 ....6.70
Geneva,Utah C11 .....6.00
Johnstown,Pa. B2 .....5.65
SparrowsPoint,Md. B2 ..5.65

PLATES, Wrought Iron

Economy,Pa. B14 ....11.128

PLATES, High-Strength Low-Alloy

Aliquippa,Pa. J5 .....7.25
Bessemer,Ala. T2 .....7.25
Clairton,Pa. U5 .....7.25
Claymont,Del. C22 ....7.55
Cleveland J5, R2 .....7.25
Coatesville,Pa. L7 .....7.55
Conshohocken,Pa. A3 ..7.25
Ecorse,Mich. G5 .....7.35
Fairfield,Ala. T2 .....7.25
Fontana,Calif.(30) K1 .7.95
Gary,Ind. U5 .....7.25
Geneva,Utah C11 .....7.25
Houston 85 .....7.35
Ind.Harbor,Ind. I-2, Y1 7.25
Johnstown,Pa. B2 .....7.25
Munhall,Pa. U5 .....7.25
Pittsburgh J5 .....7.25
Seattle B3 .....8.15
Sharon,Pa. S3 .....7.25
S.Chicago,Ill. U5, W14 ..7.25
SparrowsPoint,Md. B2 ..7.25
Warren,O. R2 .....7.25
Youngstown U5, Y1 ....7.25

PLATES, Alloy

Bridgeport,Conn. N19 ..6.55
Claymont,Del. C22 .....6.85
Coatesville,Pa. L7 .....6.85
Fontana,Calif.(30) K1 ..7.55
Gary,Ind. U5 .....6.85
Houston 85 .....6.95
Ind.Harbor,Ind. Y1 ....6.85
Johnstown,Pa. B2 .....6.85
Munhall,Pa. U5 .....6.85
Newport,Ky. N9 .....6.85
Seattle B3 .....7.75
Sharon,Pa. S3 .....6.85
S.Chicago,Ill. U5, W14 ..6.85
SparrowsPoint,Md. B2 ..6.85
Youngstown Y1 .....6.85

FLOOR PLATES

Cleveland J5 .....5.925
Conshohocken,Pa. A3 ..5.925
Harrisburg,Pa. P4 ....6.275
Ind.Harbor,Ind. I-2 ...5.925
Munhall,Pa. U5 .....5.925
S.Chicago,Ill. U5 .....5.925

PLATES, Ingot Iron

Ashland c.l. (15) A10 .5.10
Ashland l.c.l. (15) A10..5.60
Cleveland c.l. R2 .....5.60
Warren,O. c.l. R2 .....5.60

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala.City,Ala.(9) R2 ..5.075
Aliquippa,Pa.(9) J5 ..5.075
Alton,Ill. L1 .....5.275
Atlanta(9) A11 .....5.575
Bessemer,Ala.(9) T2 ..5.075
Birmingham(9) C15 ...5.375
Bridgeport,Conn. N19 ..5.30
Buffalo(9) R2 .....5.075
Clairton,Pa. U5 .....5.075
Cleveland(9) R2 .....5.075
Ecorse,Mich.(9) G5 ...5.175
Emeryville,Calif. J7 ....5.85
Fairfield,Ala.(9) T2 ..5.075
Fairless,Pa.(9) U5 ....5.225
Fontana,Calif.(9) K1 ..5.775
Gary,Ind.(9) U5 .....5.075
Geneva(9) C11 .....5.175
Houston(9) 85 .....5.325
Ind.Harbor(9) I-2, Y1 ..5.075
Johnstown,Pa.(9) B2 ..5.075
Joliet,Ill. P22 .....5.575
KansasCity,Mo.(9) 85 ..5.325
Lackawanna(9) B2 ....5.075
LosAngeles(9) B3 .....5.775
Midland,Pa.(9) C18 ...5.425
Milton,Pa.(23) M18 ...5.425
Minnequa,Colo. C10 ...5.525
Niles,Calif. P1 .....5.85
N.T'wanda,N.Y.(9)B11 5.075
Pittsburg,Calif.(9) C11 5.775
Pittsburgh(9) J5 .....5.075
Portland,Oreg. O4 .....5.85
Seattle B3, N14 .....5.825
S.Ch'e'go(9) R2,U5,W14 5.075
S.Duquesne,Pa.(9) U5 ..5.075
S.SanFran.,Calif.(9) B3 5.825
Sterling,Ill.(1) N15 ....5.075
Sterling,Ill. N15 .....5.175
Struthers,O. Y1 .....5.075
Torrance,Calif.(9) C11 .5.775
Weirton,W.Va.(9)W6 ....5.075
Youngstown(9) R2, U5 5.075

BARS, H.R. Loaded Alloy (Including loaded extra)

Warren,O. C17 .....7.125

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2 .....6.125
Bridgeport,Conn. N19 ..6.20
Buffalo R2 .....6.125
Canton,O. R2 .....6.125
Clairton,Pa. U5 .....6.125
Detroit R7 .....6.125
Ecorse,Mich. G5 .....6.225
Fairless,Pa. U5 .....6.275
Fontana,Calif. K1 ....7.175
Gary,Ind. U5 .....6.125
Houston 85 .....6.375
Ind.Harbor,Ind. I-2, Y1 6.125
Johnstown,Pa. B2 .....6.125
KansasCity,Mo. 85 ....6.375
Lackawanna,N.Y. B2 ..6.125
LosAngeles B3 .....7.175
Massillon,O. R2 .....6.125
Midland,Pa. C18 .....6.125
S.Chicago R2, U5, W14 6.125
S.Duquesne,Pa. U5 ....6.125
Struthers,O. Y1 .....6.125
Warren,O. C17 .....6.125
Youngstown U5 .....6.125

BARS & SMALL SHAPES, H.S. High-Strength Low-Alloy

Aliquippa,Pa. J5 .....7.425
Bessemer,Ala. T2 .....7.425
Bethlehem,Pa. B2 .....7.425
Bridgeport,Conn. N19 ..7.50
Clairton,Pa. U5 .....7.425
Cleveland R2 .....7.425
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.425
Fontana,Calif. K1 ....8.125
Gary,Ind. U5 .....7.425
Houston 85 .....7.675
Ind.Harbor,Ind. Y1 ....7.425
Johnstown,Pa. B2 .....7.425
KansasCity,Mo. 85 ....7.675
Lackawanna,N.Y. B2 ..7.425
LosAngeles B3 .....8.125
Pittsburgh J5 .....7.425
Seattle B3 .....8.175
S.Chicago U5, W14 ....7.425
S.Duquesne,Pa. U5 ....7.425
S.SanFrancisco B3 ....8.175
Struthers,O. Y1 .....7.425
Youngstown U5 .....7.425

BAR SIZE ANGLES, H.R. Carbon

Bethlehem,Pa.(9) B2 ..5.225
Lackawanna(9) B2 ....5.075
Sterling,Ill. N15 .....5.175
Sterling,Ill.(1) N15 ....5.075

BAR SIZE ANGLES, S. Shapes

Aliquippa,Pa. J5 .....5.075
Atlanta A11 .....5.575
Fontana,Calif. K1 .....5.35
Joliet,Ill. P22 .....5.10
Niles,Calif. P1 .....5.85
Pittsburgh J5 .....5.075
Portland,Oreg. O4 .....5.85
SanFrancisco B7 .....5.95

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. U5 .....6.20
Gary,Ind. U5 .....6.20
Houston 85 .....6.45
KansasCity,Mo. 85 ....6.45
Youngstown U5 .....6.20

BARS, C.F. Loaded Alloy (Including loaded extra)

Ambridge,Pa. W18 ....9.225
Chicago W18 .....9.225
Cleveland C20 .....9.475
LosAngeles S30 .....11.10
LosAngeles P2 .....11.00
Monaca,Pa. S17 .....9.225
Newark,N.J. W18 .....9.40
Warren,O. C17 .....9.475

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 ....6.85
BeaverFalls,Pa. M12,R2 6.85
Bridgeport,Conn. N19 ..7.20
Buffalo B5 .....6.90
Camden,N.J. P13 .....7.30
Carnegie,Pa. C12 .....6.85
Chicago W18 .....6.85
Cleveland A7, C20 ....6.85
Detroit B5, P17 .....7.05
Detroit R7 .....6.85
Donora,Pa. A7 .....6.85
Elyria,O. W8 .....6.85
FranklinPrk,Ill. N5 ....6.85
Gary,Ind. U5 .....6.85
GreenBay,Wis. F7 .....6.85
Hammond,Ind. L2, M13 .6.85
Hartford,Conn. R2 .....7.35
Harvey,Ill. B5 .....6.85
LosAngeles(49) S30 ....8.30
LosAngeles P2, R2 .....8.30
Mansfield,Mass. B5 ....7.40
Massillon,O. R2, R8 ..6.85
Midland,Pa. C18 .....6.85
Monaca,Pa. S17 .....6.85
Newark,N.J. W18 .....7.30
NewCastle,Pa.(17) B4 ..6.85
Pittsburgh J5 .....6.85
Plymouth,Mich. P5 .....7.10
Putnam, Conn. W18 ....7.40
Readville,Mass. C14 ....7.40
S.Chicago,Ill. W14 ....6.85
SpringCity,Pa. K3 .....7.30
Struthers,O. Y1 .....6.85
Waukegan,Ill. A7 .....6.85
Youngstown F3, Y1 ....6.85

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md.(5) C19..6.10

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ....8.325
BeaverFalls,Pa. M12,R2 8.325
Bethlehem,Pa. B2 .....8.325
Bridgeport,Conn. N19 ..8.475
Buffalo B5 .....8.325
Camden,N.J. P13 .....8.50
Canton,O. T7 .....7.425
Carnegie,Pa. C12 .....8.325
Chicago W18 .....8.325
Cleveland A7, C20 ....8.325
Detroit B5, P17 .....8.525
Detroit R7 .....8.325
Donora,Pa. A7 .....8.325
Elyria,O. W8 .....8.325
FranklinPark,Ill. N5 ..8.325
Gary,Ind. R2 .....8.325
GreenBay,Wis. F7 .....8.325
Hammond,Ind. L2,M13 .8.325
Hartford,Conn. R2 .....8.625
Harvey,Ill. B5 .....8.325
Lackawanna,N.Y. B2 ..8.325
LosAngeles P2, S30 ...10.10
Mansfield,Mass. B5, ...8.625
Massillon,O. R2, R8 ..8.325
Midland,Pa. C18 .....8.325
Monaca,Pa. S17 .....8.325
Newark,N.J. W18 .....8.50
Plymouth,Mich. P5 .....8.525
S.Chicago W14 .....8.325
SpringCity,Pa. K3 .....8.50
Struthers,O. Y1 .....8.325
Warren,O. C17 .....8.325
Waukegan,Ill. A7 .....8.325
Worcester,Mass. A7 ....8.625
Youngstown F3, Y1 ....8.325

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2 .....5.075
Atlanta A11 .....5.575
Birmingham C15 .....5.375
Bridgeport,Conn. N19 ..5.30
Buffalo R2 .....5.075
Cleveland R2 .....5.075
Ecorse,Mich. G5 .....5.425
Emeryville,Calif. J7 ....5.85
Fairfield,Ala. T2 .....5.075
Fairless,Pa. U5 .....5.225
Fontana,Calif. K1 .....5.80

Ft. Worth, Tex. (42) T4 .6.525
Gary, Ind. U5 .....5.075
Houston S5 .....5.225
Ind. Harbor, Ind. I-2, Y1 5.075
Johnstown, Pa. B2 .....5.075
Joliet, Ill. P22 .....5.575
KansasCity, Mo. S6 ...5.225
Lackawanna, N.Y. B2 ..5.075
LosAngeles B3 .....5.775
Milton, Pa. M18 .....5.225
Minnequa, Colo. C10 ..5.525
Niles, Calif. P1 .....5.85
Pittsburg, Calif. C11 ..5.775
Pittsburgh J5 .....5.075
Portland, Oreg. O4 .....5.85
SandSprings, Okla. S5..5.575
Seattle B3, N14 .....5.825
S. Chicago R3 .....5.075
S. Duquesne, Pa. U5 ...5.075
S. SanFrancisco B3 ....5.825
SparrowsPoint, Md. B2.5.075
Sterling, Ill. (1) N15 ...5.075
Sterling, Ill. N15 .....5.175
Struthers, O. Y1 .....5.075
Torrance, Calif. C11 ...5.775
Youngstown R2, U8....5.075

BARS, Reinforcing
(Fabricated; to Consumers)

Chicago U8 .....6.81
Cleveland U8 .....6.79
Johnstown, Pa. ¼-1" B2.6.73
KansasCity Kans. S5 ..6.825
Marion, O. P11 .....6.70
New York U8 .....7.18
Pittsburgh U8 .....6.75
Seattle B3, N14 .....7.30
SparrowsPt. ¼-1" B2 ..6.73
Williamsport, Pa. S19 ..6.65

RAIL STEEL BARS

ChicagoHts. (3) C2, I-2.5.075
ChicagoHts. (4) I-2 ....5.075
ChicagoHts. (4) C2 ....5.65
Ft. Worth, Tex. (26) T4..5.525
Franklin, Pa. (4) F5 ....5.60
Franklin, Pa. (3) F5 ....5.10
JerseyShore, Pa. (4) J5 ..5.00
Marion, O. (3) P11 .....5.15
Moline, Ill. (3) R2 .....5.225
Tonawanda (3) B12 .....5.65
Tonawanda (4) B12 .....6.15
Williamsport, Pa. (3) S19.5.65

BARS, Wrought Iron

Economy, Pa. (S.R.) B14 12.305
Economy, Pa. (D.R.) B14 15.301
Economy (Staybolt) B14 15.676
McK. Rks. (S.R.) L5 ..12.305
McK. Rks. (D.R.) L5 ..16.00
McK. Rks. (Staybolt) L5.17.00

SHEETS

SHEETS, Hot-Rolled Steel
(18 Gage and Heavier)

Ala. City, Ala. R2 .....4.675
Allenport, Pa. P7 .....4.675
Ashland, Ky. (8) A10 ...4.675
Cleveland J5, R2 .....4.675
Conshohocken, Pa. A3 .4.725
Detroit (8) M1 .....4.775
Dravosburg, Pa. U5 ....4.675
Ecorse, Mich. G5 .....4.775
Fairfield, Ala. T2 .....4.675
Fairless, Pa. U5 .....4.725
Fontana, Calif. K1 ....5.475
Gary, Ind. U5 .....4.675
Geneva, Utah C11 .....4.775
GraniteCity, Ill. (8) G4 ..4.875
Ind. Harbor, Ind. I-2, Y1 4.675
Lackawanna, N.Y. B2..4.675
Munhall, Pa. U5 .....4.675
Newport, Ky. (8) N9 ...4.675
Niles, O. M21 .....4.675
Pittsburg, Calif. C11 ...5.375
Pittsburgh J5 .....4.675
Portsmouth, O. P12 ....4.675
Riverdale, Ill. A1 .....4.675
Sharon, Pa. S2 .....4.675
S. Chicago, Ill. W14 ...4.675
SparrowsPoint, Md. B2..4.675
Steubenville, O. W10 ..4.675
Warren, O. R2 .....4.675
Weirton, W. Va. W6 ....4.675
Youngstown U5, Y1 ...4.675

SHEETS, H.R., (19 ga. & Lighter)

Niles, O. M21 .....5.75

SHEETS, H.R. Alloy

Dravosburg, Pa. U5 .....7.75
Gary, Ind. U5 .....7.75
Ind. Harbor, Ind. Y1 ...7.75
Newport, Ky. N9 .....7.75
Youngstown Y1, U5 ...7.75

SHEETS, H.R. (14 Ga. & Heavier)
High-Strength Low-Alloy

Cleveland J5, R2 .....6.90
Conshohocken, Pa. A3 ..6.95
Dravosburg, Pa. U5 ....6.90
Ecorse, Mich. G5.....7.00
Fairfield, Ala. T2 .....6.90
Fairless, Pa. U5 .....6.95
Fontana, Calif. K1 .....7.70
Gary, Ind. U5 .....6.90
Ind. Harbor, Ind. I-2, Y1 6.90
Lackawanna (35) B2 ....6.90
Munhall, Pa. U5 .....6.90
Pittsburgh J5 .....6.90
S. Chicago, Ill. U5 .....6.90
SparrowsPoint (36) B2 ..6.90
Warren, O. R2 .....6.90
Weirton, W. Va. W6 ....6.90
Youngstown U5, Y1 ....6.90

SHEETS, Hot-Rolled Ingot Iron
(18 Gage and Heavier)

Ashland, Ky. (8) A10 ...4.925
Cleveland R3 .....5.425
Ind. Harbor, Ind. I-2 ...4.925
Warren, O. R2 .....5.425

SHEETS, Cold-Rolled Steel
(Commercial Quality)

Allenport, Pa. P7 .....5.75
Cleveland J5, R2 .....5.75
Conshohocken, Pa. A3 ...5.80
Dravosburg, Pa. U5 ....5.75
Detroit M1 .....5.75
Ecorse, Mich. G5 .....5.85
Fairfield, Ala. T2 .....5.75
Fairless, Pa. U5 .....5.80
Follansbee, W. Va. F4 ..5.75
Fontana, Calif. K1 .....6.95
Gary, Ind. U5 .....5.75
GraniteCity, Ill. G4 ....5.95
Ind. Harbor, Ind. I-2, Y1 5.75
Lackawanna, N.Y. B2 ..5.75
Mansfield, O. E6 .....5.75
Middletown, O. A10 ....5.75
Newport, Ky. N9 .....5.75
Pittsburg, Calif. C11 ...6.70
Pittsburgh J5 .....5.75
Portsmouth, O. P12 ....5.75
SparrowsPoint, Md. B2 ..5.75
Steubenville, O. W10 ....5.75
Warren, O. R2 .....5.75
Weirton, W. Va. W6 ....5.75
Youngstown Y1 .....5.75

SHEETS, Cold-Rolled
High-Strength, Low-Alloy

Cleveland J5, R2 .....8.525
Dravosburg, Pa. U5 ....8.525
Ecorse, Mich. G5 .....8.625
Fairless, Pa. U5 .....8.575
Fontana, Calif. K1 ....9.725
Gary, Ind. U5 .....8.525
IndianaHarbor, Ind. Y1..8.525
Lackawanna (37) B2 ..8.525
Pittsburgh J5 .....8.525
SparrowsPoint (38) B2 .8.525
Warren, O. R2 .....8.525
Weirton, W. Va. W6 ....8.525
Youngstown Y1 .....8.525

SHEETS, Cold-Rolled Ingot Iron

Cleveland R3 .....6.50
Middletown, O. A10 ....6.25
Warren, O. R2 .....6.50

SHEETS, Culvert	Cu Steel	Cu Fe
Ashland, Ky.	A10	6.65	6.90
Canton, O.	R2	6.65	7.15
Dravosburg	U5	6.65	6.90
Fairfield	T2	6.65	6.90
Gary, Ind.	U5	6.65	6.90
Ind. Harbor	I-2	6.65	6.90
Kokomo, Ind.	C16	6.75	...
MartinsFry.	W10	6.65	...
Pitts., Calif.	C11	7.40	...
SparrowsPt.	B2	6.65	...

SHEETS, Culvert—Pure Iron

Dravosburg U5 .....8.50
Gary, Ind. U5 .....6.90
Ind. Harbor, Ind. I-2 ....6.90
MartinsFry., O. W10 ....6.90

SHEETS, Galvanized Steel
Hot-Dipped

Ala. City, Ala. R2 .....6.30†
Ashland, Ky. A10 .....6.30†
Canton, O. R2 .....6.30†
Dover, O. R1 .....6.30†
Dravosburg, Pa. U5 ...6.30†
Fairfield, Ala. T2 .....6.30†
Gary, Ind. U5 .....6.30†
GraniteCity, Ill. G4 ....6.50†
Ind. Harbor, Ind. I-2 ..6.30†
Kokomo, Ind. C16 .....6.40†
MartinsFerry, O. W10 ..6.30*
Middletown, O. A10 ....6.30†
Pittsburg, Calif. C11 ...7.05*
Pittsburgh J5 .....6.30†
SparrowsPt., Md. B2 ..6.30†
Warren, O. R2 .....6.30†
Weirton, W. Va. W6 ....6.30*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana, Calif. K1 ....6.975

SHEETS, Galvanized
High-Strength Low-Alloy

Dravosburg, Pa. U5 ...9.275
SparrowsPoint (39) B2..9.275

SHEETS, Galvannealed Steel

Canton, O. R2 .....6.70
Dravosburg, Pa. U5 ....6.70
Kokomo, Ind. C16 .....7.00

SHEETS, Galvanized Ingot Iron
(Hot-dipped Continuous)

Ashland, Ky. A10 .....6.55
Middletown, O. A10 .....6.55

SHEETS, Electrogalvanized

Cleveland (28) R2 .....7.125
Niles, O. (28) R2 .....7.125
Weirton, W. Va. W6 ....6.975

SHEETS, Aluminum Coated

Butler, Pa. A10 (type 1) 8.95
Butler, Pa. A10 (type 2) 9.05

SHEETS, Enameling Iron

Ashland, Ky. A10 .....6.325
Cleveland R2 .....6.325
Dravosburg, Pa. U5 ....6.325
Gary, Ind. U5 .....6.325
GraniteCity, Ill. G4 ....6.525
Ind. Harbor, Ind. I-2, Y1 6.325
Middletown, O. A10 ....6.325
Niles, O. M21 .....6.325
Youngstown Y1 .....6.325

BLUED STOCK, 29 Gage

Follansbee, W. Va. F4 ..8.35
Ind. Harbor, Ind. I-2 ....8.175
Yorkville, O. W10 .....8.175

SHEETS, Long Terne Steel
(Commercial Quality)

BeechBottom, W. Va. W10 6.70
Gary, Ind. U5 .....6.70
Mansfield, O. E6 .....6.70
Middletown, O. A10 ....6.70
Niles, O. M21 .....6.70
Weirton, W. Va. W6 ....6.70

SHEETS, Long Terne, Ingot Iron

Middletown, O. A10 ....7.10

Key To Producers

A1 Acme Steel Co.
A2 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div. Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C7 Cleve. Cold Rolling Mills
C9 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div. H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Dearborn Division Sharon Steel Corp.
D4 Disston & Sons, Henry
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 EasternGas&FuelAssoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div. Borg-Warner Corp.
F6 Frets-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F9 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md. Fine&Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Division, Merritt-Chapman&Scott
M21 Mallory-Sharon Titanium Corp.

N1 NationalStandard Co.
N2 National Supply Co.
N3 NationalTube Div., U. S. Steel Corp.
N5 Nelson Steel & Wire Co.
N8 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest. SteelRoll. Mill
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
N19 Northeastern Steel Corp.
O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 PacificStatesSteelCorp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co. Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 Reliance Div., EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service

T3 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div. U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Div., H. K. Porter Co. Inc.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ..4.675
Allenport,Pa. P7 .....4.675
Alton,Ill. L1 .....4.675
Ashland,Ky.(8) A10 ...4.675
Atlanta A11 .....4.675
Bessemer,Ala. T2 .....4.675
Birmingham C15 .....4.975
Bridgeport,Conn. N19..4.625
Buffalo(27) R2 .....4.675
Conshohocken,Pa. A3 ..4.725
Detroit M1 .....4.775
Ecorse,Mich. G5 .....4.775
Fairfield,Ala. T2 .....4.675
Fontana,Calif. K1 ....5.475
Gary,Ind. U5 .....4.675
Houston S5 .....4.925
Ind.Harbor,Ind. I-2, Y1 4.675
Johnstown,Pa.(25) B2..4.675
KansasCity S5 .....4.925
Lackaw'na,N.Y.(25) B2 4.675
LosAngeles(25) B3 ...5.425
Minnequa,Colo. C10 ...5.775
Pittsburg,Calif. C11 ..5.425
Riverdale,Ill. A1 .....4.675
SanFrancisco S7 .....5.95
Seattle(25) B3 .....5.675
Seattle N14 .....5.675
Sharon,Pa. S3 .....4.675
S.Chicago,Ill. W14 ....4.675
S.SanFrancisco(25) B3..5.425
SparrowsPoint,Md. B2..4.675
Sterling,Ill.(1) N15 ...4.675
Sterling,Ill. N15 .....4.775
Torrance,Calif. C11 ..5.425
Warren,O. R2 .....4.675
Weirton,W.Va. W6 ....4.675
Youngstown U5 .....4.675

STRIP, Hot-Rolled Alloy

Bridgeport,Conn. N19 ..7.50
Carnegie,Pa. S18 .....7.75
Dravosburg U5 .....7.75
Fontana,Calif. K1 .....9.65
Gary,Ind. U5 .....7.75
Ind.Harbor,Ind. Y1 ....7.75
Los Angeles B3 .....8.95
Newport,Ky. N9 .....7.75
Sharon,Pa. S3 .....7.75
S. Chicago W14 .....7.75
Youngstown U5, Y1 ...7.75

STRIP, Hot-Rolled High-Strength, Low-Alloy

Bessemer,Ala. T2 .....6.95
Conshohocken,Pa. A3 ..6.95
Ecorse,Mich. G5 .....7.05
Fairfield,Ala. T2 .....6.95
Fontana,Calif. K1 ....8.025
Gary,Ind. U5 .....6.95
Houston S5 .....7.20
Ind.Harbor,Ind. I-2, Y1..6.95
KansasCity,Mo. S5 .....7.20
Lackawanna,N.Y. B2 ...6.95
LosAngeles(25) B3 ....7.70
Seattle(25) B3 .....7.95
Sharon,Pa. S3 .....6.95
S.SanFrancisco(25) B3..7.70
SparrowsPoint,Md. B2 ..6.95
Warren,O. R2 .....6.95
Weirton,W.Va. W6 ....6.95
Youngstown U5, Y1 ...6.95

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ..4.925
Warren,O. R2 .....5.425

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....6.85
Baltimore T6 .....6.85
Boston T6 .....7.40
Buffalo S40 .....6.85
Cleveland A7, J5 .....6.85
Conshohocken,Pa. A3 ..6.90
Dearborn,Mich. D3 ....6.95
Detroit D2, M1, P20 ..6.95
Dover,O. G6 .....6.85
Ecorse,Mich. G5 .....5.95
Follansbee,W.Va. F4 ...6.85
Fontana,Calif. K1 .....8.60
Franklin Park,Ill. T6 ...6.95
Ind.Harbor,Ind. Y1 ....6.85
Indianapolis C8 .....7.00
Lackawanna,N.Y. B2 ...6.25
LosAngeles C1 .....8.90
NewBedford,Mass. R10 ..7.30
NewBritain(10) S15 ....6.85
NewCastle,Pa. B4, E5 ..6.85
NewHaven,Conn. D2 ...7.30
NewKensington,Pa. A6 ..6.85
Pawtucket,R.I. R3 .....7.50
Pawtucket,R.I. N8 .....7.40
Pittsburgh J5 .....6.85
Riverdale,Ill. A1 .....6.95
Rome,N.Y. (32) R6 .....6.85
Sharon,Pa. S3 .....6.85
SparrowsPt., Md. B2 ...6.25
Trenton,N.J.(31) R5 ....8.10
Wallingford,Conn. W2 ..7.30
Warren,O. R2, T5 .....6.85
Weirton,W.Va. W6 .....6.85
Worcester,Mass. A7 ....7.40
Youngstown C8, Y1 ....6.85

STRIP, Cold-Rolled Alloy

Boston T6 .....14.90
Carnegie,Pa. S18 .....14.55
Cleveland A7 .....14.55
Dover,O. G6 .....14.55
FranklinPark,Ill. T6 ....14.55
Harrison,N.J. C18 .....14.55
Indianapolis C8 .....14.70
Pawtucket,R.I. N8 .....14.90
Sharon,Pa. S3 .....14.55
Worcester,Mass. A7 ....14.85
Youngstown C8 .....14.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.00
Dearborn,Mich. D3 ....10.10
Dover,O. G6 .....10.10
Ecorse,Mich. G5 .....10.10
Ind.Harbor,Ind. Y1 ...10.20
Lackawanna,N.Y. B2 ..9.10
Sharon,Pa. S3 .....10.00

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	8.50	10.10	12.90	15.30	18.25
Boston T6	8.50	10.10	12.90	15.30	18.25
Bristol,Conn. W1	...	...	12.90	15.30	18.25
Carnegie,Pa. S18	...	9.80	12.60	15.00	....
Cleveland A7	7.95	9.80	12.60	15.00	17.95
Cleveland C7	...	9.80	12.60	15.00	17.95
Dover,O. G6	7.95	9.80	12.60	15.00	17.95
Detroit D2	8.05	9.90	12.70	15.10	....
Dearborn,Mich. D3	8.05	9.90	12.70	....	....
FranklinPark,Ill. T6	8.05	9.80	12.60	15.00	17.95
Harrison,N.J. C18	...	...	12.90	15.30	18.25
Indianapolis C8	8.10	9.95	12.60	15.00	17.95
NewBritain Conn.(10) S15	7.95	9.80	12.60	15.00	17.95
NewCastle,Pa. B4, E5	7.95	9.80	12.60	15.00	....
NewHaven,Conn. D2	8.40	10.10	12.90	15.30	....
NewKensington,Pa. A6	7.95	9.80	12.60	15.00	....
NewYork W3	...	10.10	12.90	15.30	18.25
Pawtucket,R.I. N8	8.50	10.10	12.90	15.30	18.25
Riverdale,Ill. A1	8.05	9.80	12.60	15.00	17.95
Rome,N.Y. (32) R6	7.95	9.80	12.60	15.00	17.95
Sharon,Pa. S3	7.95	9.80	12.60	15.00	17.95
Trenton,N.J. R5	...	10.10	12.90	15.30	18.25
Wallingford,Conn. W2	8.40	10.10	12.90	15.30	18.15
Warren,O. T5	7.95	9.80	12.60	15.00	17.95
Weirton,W.Va. W6	7.95	9.80	12.60	15.00	17.95
Worcester,Mass. A7, T6..	8.50	10.10	12.90	15.30	18.25
Youngstown C8	7.95	9.80	12.60	15.00	17.95

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	16.80	20.65	....
Buffalo W12	16.80	....	....
FranklinPark,Ill. T6	17.15	21.00	25.35
Harrison,N.J. C18	16.80	20.65	25.00
NewYork W3	16.80	20.65	25.00
Palmer,Mass. W12	16.80	....	....
Trenton,N.J. R5	16.80	20.65	25.00
Worcester,Mass. W12	14.80	....	....
Worcester,Mass. A7, T6..	16.80	20.65	25.00
Youngstown C8	17.15	21.00	25.35

STRIP, Galvanized (Continuous)

Sharon,Pa. S3 .....6.975

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.40
Riverdale,Ill. A1 .....5.25
Sharon,Pa. S3 .....5.10
Youngstown U5 .....5.10

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....7.60

STRIP, Electrogalvanized

Cleveland A7 .....6.85*
Dover,O. G6 .....6.85*
Riverdale,Ill. A1 .....6.95*
Warren,O. B9, T5 .....6.85*
Worcester,Mass. A7 ...7.40*
Youngstown C8 .....6.85*

*Plus galvanizing extras.

SILICON STEEL

H.R. SHEETS (22 Ga., cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W19 ..	...	...	11.00	12.05	13.05
Brackenridge,Pa. A4	...	...	11.00	12.05	13.05
Mansfield,O. E6	9.20	10.35	11.00	12.05	13.05
Newport,Ky. N9	9.20	10.35	11.00	12.05	13.05
Niles,O. M21	9.20	10.35	11.00	12.05	....
Vandergrift,Pa. U5	...	10.35	11.00	12.05	13.05
Warren,O. R2	9.20	10.35	11.00	12.05	....
Zanesville,O. A10	...	10.35	11.00	12.05	13.05
Zanesville A10 (FP coils).	...	10.85	11.525	12.575	13.55
Zanesville A10 (BP coils)..	...	....	11.025	12.075	13.05

C.R. COILS & CUT LENGTHS, (22 Ga.) Fully Processed (Semiprocessed 1½c lower)	Field	Armature	Electric	Motor	Dynamo
Brackenridge,Pa. A4	....	....	11.525	12.575	13.55
GraniteCity,Ill. G4	9.40*	10.55*	11.225*	12.275*	....
IndianaHarbor,Ind. I-2...	9.20†	10.35*	11.025*	12.075*	....
Mansfield,O. E6	9.70	10.85	11.525	12.575	13.55
Vandergrift,Pa. U5	9.20*	10.35*	11.025*	12.075*	13.05*
Vandergrift,Pa. U5	....	10.85†	11.525†	12.575†	13.55†
Warren,O. R2	9.20*	10.85	11.525	12.575	13.55

H.R. SHEETS (22 Ga., cut lengths)	Transformer Grade T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	14.05	14.60	15.10	16.15
Brackenridge,Pa. A4	14.05	....	....	....
Vandergrift,Pa. U5	14.05	14.60	15.10	16.15
Zanesville,O. A10	14.05	14.60	15.10	16.15

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-64	T-72
Brackenridge,Pa. A4.	18.90	18.50	19.00	19.50	14.05**	
Butler Pa. A10	....	....	18.50	19.00	19.50	....
Vandergrift,Pa. U5 ..	18.90	18.90	18.50	19.00	19.50	14.55**
Warren,O. R2	....	....	....	....	....	14.55†

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. **Cut lengths, ¾-cent lower.

TIN MILL PRODUCTS

TIN PLATE Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$8.30	$8.55	$8.95
Dravosburg,Pa. U5	8.30	8.55	8.95
Fairfield,Ala. T2	8.40	8.65	9.05
Fairless,Pa. U5	8.40	8.65	9.05
Fontana,Calif. K1	9.05	9.30	9.70
Gary,Ind. U5	8.30	8.55	8.95
GraniteCity,Ill. G4	8.40	8.65	9.05
IndianaHarbor,Ind. I-2, Y1	8.30	8.55	8.95
Niles,O. R2	8.30	8.55	8.95
Pittsburg,Calif. C11	9.05	9.30	9.70
SparrowsPoint,Md. B2	8.40	8.65	9.05
Weirton,W.Va. W6	8.30	8.55	8.95
Yorkville,O. W10	8.30	8.55	8.95

ELECTROTIN (22-27 Gage; Dollars per 100 lb)

Aliquippa,Pa. J5	6.975	....	....
*Niles,O. R2	*7.425*	*7.625*	*7.825*

TINPLATE, American	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$9.60	$9.85
Dravosburg,Pa. U5	9.60	9.85
Fairfield,Ala. T2	9.70	9.95
Fairless,Pa. U5	9.70	9.95
Fontana,Calif. K1	10.35	10.60
Gary,Ind. U5	9.60	9.85
Ind.Harbor Y1	9.60	9.85
Pitts.,Calif. C11	10.35	10.60
Sp.Pt.,Md. B2	9.70	9.95
Weirton,W.Va. W6	9.60	9.85
Yorkville,O. W10	9.60	9.85

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$7.40
Dravosburg,Pa. U5	7.40
Fairfield,Ala. T2	7.50
Fairless,Pa. U5	7.50
Fontana,Calif. K1	8.15
Gary,Ind. U5	7.40
GraniteCity,Ill. G4	7.50
Ind.Harbor,Ind. I-2, Y1	7.40
Niles,O. R2	7.40
Pittsburg,Calif. C11	8.15
SparrowsPoint,Md. B2	7.50
Weirton,W.Va. W6	7.40
Yorkville,O. W10	7.40

HOLLOWARE ENAMELING Black Plate (29 Gage)

Dravosburg,Pa. U5	$7.15
Gary,Ind. U5	7.15
GraniteCity,Ill. G4	7.25
Ind.Harbor,Ind. Y1	7.15
Yorkville,O. W10	7.15

MANUFACTURING TERNES (Special Coated; Base Box)

Dravosburg,Pa. U5	$9.10
Gary,Ind. U5	9.10
Yorkville,O. W10	9.10

MANUFACTURING TERNES (Light Coated, 6 lb; Base Box)

Yorkville,O. W10	$9.55

ROOFING SHORT TERNES (8 lb Coated; Base Box)

Gary,Ind. U5	$10.65

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ..7.20
Aliquippa,Pa. J5 .....7.20
Alton,Ill. L1 .....7.40
Atlanta A11 .....7.40
Bartonville,Ill. K4 .....7.30
Buffalo W12 .....7.20
Chicago W13 .....7.20
Cleveland A7, C20 ....7.20
Crawfordsville,Ind. M8..7.30
Donora,Pa. A7 .....7.20
Duluth,Minn. A7 .....7.20
Fairfield,Ala. T2 .....7.20
Fostoria O.(24) S1 ....7.30
Houston S5 .....7.45
Jacksonville,Fla. M8 ...7.55
Johnstown,Pa. B2 .....7.20
Joliet,Ill. A7 .....7.20
KansasCity,Mo. S5 .....7.45
Kokomo,Ind. C16 .....7.30
LosAngeles B3 .....8.15
Minnequa,Colo. C10 .....7.45
Monessen,Pa. P7, P16..7.20
N.Tonawanda B11 .....7.20
Palmer,Mass. W12 .....7.50
Pittsburg,Calif. C11 ....8.15
Portsmouth,O. P12 .....7.20
Rankin,Pa. A7 .....7.20
S.Chicago,Ill. R2 .....7.20
S.SanFrancisco C10 ....8.15
SparrowsPoint,Md. B2..7.30
Sterling,Ill.(1) N15 .....7.20
Sterling,Ill. N15 .....7.30
Struthers,O. Y1 .....7.20
Waukegan,Ill. A7 .....7.20
Worcester,Mass. A7 ....7.50

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5 .....8.725
Alton,Ill. L1 .....8.925
Bartonville,Ill. K4 .....8.825
Buffalo W12 .....8.725
Cleveland A7 .....8.725
Donora,Pa. A7 .....8.725
Duluth,Minn. A7 .....8.725
Fostoria,O. S1 .....8.775
Johnstown,Pa. B2 .....8.725
LosAngeles B3 .....9.675
Milbury,Mass.(12) N6..9.025
Minnequa,Colo. C10 ...8.975
Monessen,Pa. P7, P16..8.725
Muncie,Ind. I-7 .....8.925
Palmer,Mass. W12 .....9.025
Pittsburg,Calif. C11 ...9.675
Portsmouth,O. P12 .....8.725
Roebling,N.J. R5 .....9.025
S.Chicago,Ill. R2 .....8.725
S.SanFrancisco C10 ...9.675
SparrowsPt.,Md. B2 ...8.825
Struthers,O. Y1 .....8.725
Trenton,N.J. A7 .....9.025
Waukegan,Ill. A7 .....8.725
Worcester,Mass. J4 .....9.025
Worcester,Mass. A7, T6.9.025

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....8.40
Alton,Ill. L1 .....8.60
Buffalo W12 .....8.40
Cleveland A7 .....8.40
Donora,Pa. A7 .....8.40
Duluth,Minn. A7 .....8.40
Johnstown,Pa. B2 .....8.40
KansasCity,Mo. S5 .....8.65
LosAngeles B3 .....9.35
Minnequa,Colo. C10 ....8.60
Monessen,Pa. P7, P16..8.40
NewHaven,Conn. A7 ...8.70
Palmer,Mass. W12 .....8.70
Pittsburg,Calif. C11 ....9.35
Portsmouth,O. P12 .....8.40
Roebling,N.J. R5 .....8.70
S.Chicago,Ill. R2 .....8.40
S.SanFrancisco C10 ....9.35
SparrowsPoint,Md. B2..8.50
Struthers,O. Y1 .....8.40
Trenton,N.J. A7 .....8.70
Waukegan,Ill. A7 .....8.40
Worcester,Mass. A7 ....8.70

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....14.35
Bartonville,Ill. K4 .....14.25
Buffalo W12 .....14.15
Chicago W13 .....13.55
Cleveland A7 .....14.15
Crawfordsville,Ind. M8..14.25
Fostoria O. S1 .....14.15
Jacksonville,Fla. M8 ..14.50
Johnstown,Pa. B2 .....14.15
Kokomo,Ind. C16 .....14.15
Minnequa,Colo. C10 ...13.90
Monessen,Pa. P6 .....14.15
Muncie,Ind. I-7 .....14.35
Palmer,Mass. W12 .....14.45
Roebling,N.J. C10 .....14.45
S.SanFrancisco C10 ....14.50
Waukegan,Ill. A7 .....14.15
Worcester,Mass. A7, T6.14.45

WIRE, Gal'd ACSR for Cores

Bartonville,Ill. K4 .....11.75
Buffalo W12 .....11.75
Johnstown,Pa. B2 .....11.75
Minnequa,Colo. C10 ..11.875
Monessen,Pa. P16 .....11.75
Muncie,Ind. I-7 .....11.95
Palmer,Mass. W12 .....12.05
Pittsburg,Calif. C11 ....12.55
Portsmouth,O. P12 .....11.75
Roebling,N.J. R5 .....12.05
SparrowsPt.,Md. B2 ...11.85
Struthers,O. Y1 .....11.75

ROPE WIRE (A)

Bartonville,Ill. K4 .....11.55
Buffalo W12 .....11.55
Fostoria,O. S1 .....11.55
Johnstown,Pa. B2 .....11.55
Monessen,Pa. P7, P16..11.55
Muncie,Ind. I-7 .....11.75
Palmer,Mass. W12 .....11.85
Portsmouth,O. P12 .....11.35
Roebling,N.J. R5 .....11.85
SparrowsPt. B2 .....11.65
Struthers,O. Y1 .....11.55
Worcester,Mass. J4 .....11.85

(A) Plow and Mild Plow; add 0.25c for Improved Plow

WIRE

WIRE, Tire Bead

Bartonville,Ill. K4	15.20
Monessen,Pa. P16	14.45
Roebling,N.J. R5	14.35

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	10.75
Baltimore T6	11.05
Boston T6	11.05
Buffalo W12	10.75
Cleveland A7	10.75
Crawfordsville,Ind. M8	10.75
Dover,O. G6	10.75
Fostoria,O. S1	10.75
FranklinPark,Ill. T6	10.85
Kokomo,Ind. C16	10.75
Massillon,O. R8	10.75
Milwaukee C23	10.95
Monessen,Pa. P7, P16	10.75
NewKensington,Pa. A6	10.75
Palmer,Mass. W12	11.05
Pawtucket,R.I. N8	11.05
Riverdale,Ill. A1	10.85
Rome,N.Y. R6	10.75
Trenton,N.J. R5	11.05
Worcester A7, T6	11.05

NAILS, Stock

To Dealers & Mfrs. (7)	Col.
AlabamaCity,Ala. R2	167
Aliquippa,Pa. J5	167
Atlanta A11	169
Bartonville,Ill. K4	169
Chicago,Ill. W13	167
Cleveland A9	173
Crawfordsville,Ind. M8	169
Donora,Pa. A7	*164*
Duluth,Minn. A7	*164*
Fairfield,Ala. T2	*164*
Houston,Tex. S5	172
Jack'ville,Fla.(20) M8	178
Johnstown,Pa. B2	169
Joliet,Ill. A7	*164*
KansasCity,Mo. S5	172
Kokomo,Ind. C16	169
Minnequa,Colo. C10	172
Monessen,Pa. P7	167
Pittsburg,Calif. C11	*183*
Rankin,Pa. A7	*164*
S.Chicago,Ill. R2	167
SparrowsPt.,Md. B2	169
Sterling,Ill.(1) N15	167
Worcester,Mass. A7	*170*

(To Wholesalers; per cwt)

Galveston,Tex. D7 ... $5.75

NAILS, Cut (100 lb keg)

To Dealers (33)	
Conshohocken,Pa. A3	$5.60
Wheeling,W.Va. W10	5.80

STAPLES, Polished Stock

To Dealers & Mfrs. (7)	Col.
AlabamaCity,Ala. R2	167
Aliquippa,Pa. J5	167
Atlanta A11	169
Bartonville,Ill. K4	169
Crawfordsville,Ind. M8	169
Donora,Pa. A7	*164*
Duluth,Minn. A7	*164*
Fairfield,Ala. T2	*164*
Jack'ville,Fla.(20) M8	178
Johnstown,Pa. B2	169
Joliet,Ill. A7	*164*
Kokomo,Ind. C16	169
Minnequa,Colo. C10	172
Monessen,Pa. P7	167
Pittsburg,Calif. C11	*183*
Rankin,Pa. A7	*164*
S.Chicago,Ill. R2	167
SparrowsPt.,Md. B2	169
Sterling,Ill.(1) N15	167
Worcester,Mass. A7	*170*

TIE WIRE, Automatic Baler (14½ Ga.) (Per 97 lb Net Box)

Coil No. 3150	
AlabamaCity,Ala. R2	$10.03
Bartonville,Ill. K4	10.13
Buffalo W12	10.05
Crawfordsville,Ind. M8	10.13
Donora,Pa. A7	10.03
Duluth,Minn. A7	10.03
Jacksonville,Fla. M8	10.58
Johnstown,Pa. B2	10.03
Joliet,Ill. A7	10.03
Kokomo,Ind. C16	10.13
LosAngeles B3	10.82
Minnequa,Colo. C10	10.28
Pittsburg,Calif. C11	10.81
S.Chicago,Ill. R2	10.03
S.SanFrancisco C10	10.81
SparrowsPt.,Md. B2	10.13
Sterling,Ill. N15	10.03

Coil No. 6500 Stand.	
AlabamaCity,Ala. R2	$10.38
Bartonville,Ill. K4	10.45
Buffalo W12	10.35
Crawfordsville,Ind. M8	10.45
Donora,Pa. A7	10.35
Duluth,Minn. A7	10.35
Jacksonville,Fla. M8	10.91
Johnstown,Pa. B2	10.35
Joliet,Ill. A7	10.35
Kokomo,Ind. C16	10.45
LosAngeles B3	11.15
Minnequa,Colo. C10	10.60
Pittsburg,Calif. C11	11.15
S.Chicago,Ill. R2	10.35
S.SanFrancisco C10	11.15
SparrowsPt.,Md. B2	10.45
Sterling,Ill. N15	10.35

Coil Interim

AlabamaCity,Ala. R2	$10.40
Bartonville,Ill. K4	10.50
Buffalo W12	10.40
Crawfordsville,Ind. M8	10.50
Donora,Pa. A7	10.40
Duluth,Minn. A7	10.40
Jacksonville,Fla. M8	10.96
Johnstown,Pa. B2	10.40
Joliet,Ill. A7	10.40
Kokomo,Ind. C16	10.50
LosAngeles B3	11.20
Minnequa,Colo. C10	10.65
Pittsburg,Calif. C11	11.20
S.Chicago,Ill. R2	10.40
S.SanFrancisco C10	11.20
SparrowsPt.,Md. B2	10.50
Sterling,Ill. N15	10.40

WIRE, Barbed — Col.

AlabamaCity,Ala. R2	187**
Aliquippa,Pa. J5	184§
Atlanta A11	192
Bartonville,Ill. K4	192
Crawfordsville,Ind. M8	193
Donora,Pa. A7	*184†*
Duluth,Minn. A7	*184†*
Fairfield,Ala. T2	*184†*
Houston,Tex. S5	192**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	191*
Joliet,Ill. A7	*184†*
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Monessen,Pa. P7	191*
Pittsburg,Calif. C11	*204†*
Rankin,Pa. A7	*184†*
S.Chicago,Ill. R2	187**
S.SanFrancisco C10	207**
SparrowsPoint,Md. B2	193*
Sterling,Ill.(1) N15	191*

WOVEN FENCE, 9-15 Ga. — Col.

Ala.City,Ala. R2	181**
Aliq'ppa,Pa. 9-14½ga. J5	184§
Atlanta A11	187
Bartonville,Ill. K4	187
Crawfordsville,Ind. M8	187
Donora,Pa. A7	*176†*
Duluth,Minn. A7	*176†*
Fairfield,Ala. T2	*176†*
Houston,Tex. S5	186**
Jacksonville,Fla. M8	192
Johnstown,Pa.(43) B2	185
Joliet,Ill. A7	*176†*
KansasCity,Mo. S5	186**
Kokomo,Ind. C16	183†
Minnequa,Colo. C10	186**
Monessen,Pa. 9 ga. P7	185*
Pittsburg,Calif. C11	*199†*
Rankin,Pa. A7	*176†*
S.Chicago,Ill. R2	181**
Sterling,Ill.(1) N15	186*

WIRE (16 Gage)	An'ld Steel	Galv. Steel
Ala.City,Ala.R2	16.10	17.65**
Bartonville K4	16.10	18.05
Buffalo W12	16.10	—
Cleveland A7	16.10	—
Crawf'dsville M8	16.20	18.15
Fostoria,O. S1	16.20	17.75†
Jacksonville M8	16.45	18.40
Johnstown B2	16.10	18.05*
Kokomo C16	16.20	17.75†
Minnequa C10	16.45	18.15**
P'im'r,Mass.W12	16.10	17.65*
Pitts.,Calif. C11	16.45	18.00†
SparrowsPt. B2	16.20	18.15*
Sterling(1) N15	16.10	18.05*
Waukegan A7	16.10	17.65
Worcester A7	16.40	—

WIRE, Merchant Quality

(6 to 8 gage)	An'ld	Galv.
Ala.City,Ala. R2	8.10	8.80**
Aliquippa J5	8.10	8.625§
Atlanta A11	8.20	8.80
Bartonville(48) K4	8.20	8.80
Buffalo W12	8.10	8.80†
Cleveland A7	*7.95*	—
Crawfordsville M8	8.20	8.80
Donora,Pa. A7	*7.95*	*8.35†*
Duluth,Minn. A7	*7.95*	*8.35†*
Fairfield T2	*7.95*	*8.35†*
Houston(48) S5	8.35	8.75**
Jacks'ville,Fla. M8	8.45	9.05
Johnstown B2(48)	8.10	8.70*
Joliet,Ill. A7	*7.95*	*8.35†*
Kans.City(48) S5	8.35	8.75**
Kokomo C16	8.20	8.80†
LosAngeles B3	9.05	9.65*
Minnequa C10	8.35	8.75**
Monessen P7 (48)	8.10	8.70*
Palmer,Mass. W12	8.40	8.80†
Pitts.,Calif. C11	*8.95*	*9.30†*
Portsmouth,O. P12	8.10	—
Rankin,Pa. A7	*7.95*	*8.35†*
S.Chicago R2	8.10	8.50**
S.SanFran. C10	9.05	9.45**
Spar'waPt. B2(48)	8.20	8.80*
Sterling(1)(48) N15	8.10	8.70*
Struth'rs,O.(48) Y1	8.10	8.60‡
Worcester,Mass. A7	*8.25*	*8.65†*

Based on zinc price of: *13.50c. †6c. ‡10c. ‡‡Less than 10c. †††3c. **Subject to zinc equalization extras.

BALE TIES, Single Loop — Col.

AlabamaCity,Ala. R2	196
Atlanta A11	197
Bartonville,Ill. K4	197
Crawfordsville,Ind. M8	197
Donora,Pa. A7	*190*
Duluth,Minn. A7	*190*
Fairfield,Ala. T2	*190*
Jacksonville,Fla. M8	202
Joliet,Ill. A7	*190*
Houston S5	200
KansasCity,Mo. S5	200
Kokomo,Ind. C16	197
Minnequa,Colo. C10	200
Pitts.,Calif. C11	*194*
S.Chicago,Ill. R2	167
Sterling,Ill. N15	167
Tonawanda,N.Y. B12	169
Williamsport,Pa. S19	175

FENCE POSTS

ChicagoHts.,Ill. C2, I-2	167
Duluth,Minn. A7	167
Franklin,Pa. F5	167
Huntington,W.Va. W7	169
Johnstown,Pa. B2	167
Marion,O. F11	*167*
Minnequa,Colo. C10	172
Moline,Ill. R2	172
S.Chicago,Ill. R2	167
Sterling,Ill. N15	167
Tonawanda,N.Y. B12	169
Williamsport,Pa. S19	175

FASTENERS

(Base discounts, full container quantity, per cent off list, f.o.b. mill)

BOLTS

Carriage, Machine Bolts
Full Size Body (cut thread)
¼ in. and smaller:
6 in. and shorter ... 55
Longer than 6 in. ... 46.5
⅜ in. thru 1 in.:
6 in. and shorter ... 46.5
Longer than 6 in. ... 44
1⅛ in. and larger:
All lengths ... 44
Undersized Body (rolled thread)
½ in. and smaller:
6 in. and shorter ... 55

Carriage, Machine Lag Bolts
Hot Galvanized:
¼ in. and smaller:
6 in. and shorter ... 35
Longer than 6 in. ... 23
⅜ in. thru 1 in.:
6 in. and shorter ... 20
Longer than 6 in. ... 20
1⅛ in. and larger:
All lengths ... 20

Lag Bolts
All diameters:
6 in. and shorter ... 55
Longer than 6 in. ... 47

Plow and Tap Bolts
¼ in. and smaller by 6 in. and shorter ... 54
Larger than ¼ in. or longer than 6 in. ... 47
Blank Bolts ... 47
Step, Elevator, Tire Bolts 54

NUTS

Reg. & Heavy Square Nuts:
All sizes ... 50

Square Nuts, Reg. & Heavy, Hot Galvanized:
All sizes ... 45

Hex Nuts, Reg. & Heavy, Hot Pressed:
⅝ in. and smaller ... 63
⅞ in. to 1 in. incl. 59.5
1⅛ in. to 1½ in., incl. ... 64
1⅝ in. and larger ... 58

Hex Nuts, Reg. & Heavy, Cold Punched:
⅝ in. and smaller ... 63
⅞ in. to 1⅛ in., incl. 59.5
1⅛ in. and larger ... 58

Hex Nuts, All Types, Hot Galvanized:
⅝ in. and smaller ... 50
⅞ in. to 1 in., incl. 46
1⅛ in. to 1½ in., incl. ... 51

Hex Nuts, Semi-finished, Reg. & Heavy (Incl. slotted):
⅝ in. and smaller ... 63
⅞ in. to 1⅛ in., incl. 59.5
1⅛ in. and larger ... 58

Hex Nuts, Finished (Incl. Slotted and Castellated):
1 in. and smaller ... 65
1⅛ in. to 1½ in., incl. ... 62
1⅝ in. and larger ... 58
(Base discounts, packages, per cent off list, f.o.b. mill)

CAP AND SET SCREWS

Hex Head Cap Screws, Coarse or Fine Thread Bright:
6 in. and shorter:
⅝ in. and smaller ... 47
⅞, 1⅛, and 1 in., diam. ... 31
Longer than 6 in.:
⅝ in. and smaller ... 18.5
⅞, 1⅛ and 1 in. diam. ... 55

High Carbon, Heat Treated:
6 in. and shorter:
⅝ in. and smaller ... 34
⅞, 1⅛ and 1 in. diam. ... 13
Longer than 6 in.:
⅝ in. and smaller .. +1
⅞, 1⅛ and 1 in. diam. ... +19

Fillister Head, Coarse Thread:
Listed Sizes ... +31

Flat Head, Coarse Head:
¼ in. and smaller by 6 in. and shorter .. +57

Set Screws, Square Head, Cup Point, Coarse Thread:
Through 1 in. diam.:
6 in. and shorter .. 11
Longer than 6 in. .. +10

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago, and/or freight equalized with Birmingham except where equalization is too great.
Structural ½-in., larger 10.85
1/16-in. under List less 26.5%

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. in.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	23.56	22.84
1¼	13	....	27.92	22.68
1½	13	26.34	30.86	25.08
1¾	13	31.12	36.45	29.64
2	13	34.88	40.85	33.21
2¼	13	39.29	46.01	37.42
2½	12	42.64	49.94	40.61
2¾	12	46.98	55.01	44.73
2¾	12	50.86	59.57	48.44
3	12	54.24	63.53	51.66

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	Tee Rails All No. 2	Tee Rails 60 lb Under
RAILS				
Bessemer,Pa. U5	5.075	4.975	5.025	6.00
Ensley,Ala. T2	5.075	4.975	....	6.00
Fairfield,Ala. T2	....	....	....	6.00
Gary,Ind. U5	5.075	4.975	5.025	...
Huntington,W.Va. W7	....	....	....	6.15
IndianaHarbor,Ind. I-2	5.075	4.975	5.025	...
Johnstown,Pa. B2	....	....	...(16)	6.00
Lackawanna,N.Y. B2	5.075	4.975	...(16)	6.00
Minnequa,Colo. C10	5.075	4.975	....	6.50
Steelton,Pa. B2	5.075	4.975	....	...
Williamsport,Pa. S19	....	....	....	6.15

TIE PLATES

Fairfield,Ala. T2	6.025
Gary,Ind. U5	6.025
Ind.Harbor,Ind I-2	6.025
Lackawanna,N.Y. B2	6.025
Minnequa Colo. C10	6.025
Seattle B3	6.175
Steelton,Pa. B2	6.025
Torrance,Calif. C11	6.175

TRACK BOLTS, Untreated

Cleveland R2	13.10
Lebanon,Pa. B2	13.10
Minnequa,Colo. C10	13.10
Pittsburgh P14	13.10
Seattle B3	13.60

AXLES

Ind.Harbor,Ind. S13	8.10
Johnstown,Pa. B2	8.10

JOINT BARS

Bessemer,Pa. U5	6.35
Fairfield, Ala. T2	6.35
Ind.Harbor,Ind. I-2	6.35
Joliet,Ill. U5	6.35
Lackawanna,N.Y. B2	6.35
Minnequa,Colo. C10	6.35
Steelton,Pa. B2	6.35

SCREW SPIKES

Cleveland R2	12.85
Pittsburgh P14	12.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	8.775
Ind.Harbor,Ind. I-2, Y1	8.775
KansasCity,Mo. S5	8.775
Lebanon,Pa. B2	8.775
Minnequa,Colo. C10	8.775
Pittsburgh J5	8.775
Seattle B3	9.275
S.Chicago,Ill. R2	8.775
Struthers,O. Y1	8.775
Youngstown R2	8.775

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1⅝ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.25c; 1 15/16 to 8 in., inclusive, 6.00c.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 6.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.35c for 17 Ga. & heavier.
(14) Gage 0.142 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Plate only; 0.85 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) Plus 1c per 100 lb.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝-in.: 7.35c, for widths ⅝-in. and under by 0.135 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 17" and narrower.
(36) 24" and narrower.
(38) 14 Ga. & Lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.65c.
(43) 9-14½ Ga.
(48) 6-7 Ga.
(49) 3½-in. and smaller rounds; 5.65c, over 3½-in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.08		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+2	+20	4.5	+14.25	7	+11.75	8.5	+10.25	8.5	+10.25	8.25	+10.5	10.75	+8
Ambridge, Pa. N2	+2	....	4.5	....	7	....	8.5	....	8.5	....	8.25	....	10.75	....
Lorain, O. N3	+2	+20	4.5	+14.25	7	+11.75	8.5	+10.25	8.5	+10.25	8.25	+10.5	10.75	+8
Youngstown Y1	0.5	+17.5	4.5	+14.25	7	+11.75	8.5	+10.25	8.5	+10.25	8.25	+10.5	10.75	+8

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R3	+2	+20	4.5	+14.25	7	+11.75	8.5	+10.25	8.5	+10.25	8.25	+10.5	10.75	+8

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Alton, Ill. L1	....	....	....	....	....	....	10.5	+3.75	13.5	+4.75	16	+1.25	18.5	0.5
Benwood, W. Va. W10	10	+20.5	+0.25	+27.75	+9.75	+37.25	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Butler, Pa. F6	10	+20.5	0.5	+27	+8.5	+36	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Fairless, Pa. N3	....	....	....	....	....	....	10.5	+8.75	13.5	+4.75	16	+1.25	18.5	0.5
Fontana, Calif. K1	....	....	....	....	....	....	0	+19.25	3	+15.25	5.5	+11.75	8	+10
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	11.5	+7.75	14.5	+3.75	17	+0.25	19.5	1.5
Lorain, O. N3	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Sharon, Pa. S4	11	+19.5	1.5	+26	+7.5	+35	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5
Sparrows Pt., Md. B2	16	+12.5	7.5	+18	+0.5	+25	16.5	+0.75	19.5	3.25	22	6.75	24.5	8
Wheatland, Pa. W9	18	+12.5	9.5	+18	1.5	+26	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Youngstown R2, Y1	....	....	....	....	....	....	12.5	+6.75	15.5	+2.75	18	0.75	20.5	2.5

Size—Inches	1⅛		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	21	3.5	21.5	4	23	4.75	23	4.75	....	....	....	....
Alton, Ill. L1	19	1.5	19.5	2	21	2.75	21	2.75	....	....	....	....
Benwood, W. Va. W10	21	3.5	21.5	4	23	4.75	23	4.75	13.5	+0.75	13.5	+5.25
Etna, Pa. N2	21	3.5	21.5	4	23	4.75	23	4.75	13.5	+5.25	13.5	+5.25
Fairless, Pa. N3	19	1.5	19.5	2	21	2.75	21	2.75	11.5	+7.25	11.5	+7.25
Fontana, Calif. K1	8.5	+9	9	+8.5	10.5	+7.75	10.5	+7.75	1	+17.75	1	+17.75
Indiana Harbor, Ind. Y1	20	2.5	20.5	3	22	3.75	22	3.75	12.5	+6.25	12.5	+6.25
Lorain, O. N3	21	3.5	21.5	4	23	4.75	23	4.75	....	....	....	....
Sharon, Pa. M6	21	3.5	21.5	4	23	4.75	23	4.75	....	....	....	....
Sparrows Pt., Md. B2	25	9	25.5	9.5	27	9.75	27	9.75	17.5	+0.25	17.5	+0.25
Wheatland, Pa. W9	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Youngstown R2, Y1	21	3.5	21.5	4	23	4.75	23	4.75	13.5	+5.25	13.5	+5.25

*Galvanized pipe discounts based on current price of zinc (13.50c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	Seamless Tube	H.R. Strip	Wire Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	19.75	24.50	....	....	33.00	....	....	45.00	41.50	
202	21.00	27.25	33.00	....	35.75	37.25	39.25	41.25	45.25	45.25
301	20.50	25.25	33.75	....	34.00	38.25	40.50	42.50	47.25	43.75
302	22.00	28.00	34.00	....	36.75	38.75	40.75	43.00	47.50	47.50
302B	21.75	28.25	35.25	....	48.25	38.75	40.75	43.00	89.00	50.00
303	....	28.50	37.00	....	....	41.50	43.75	45.50	52.00	52.00
304	23.25	29.25	36.00	....	39.75	40.75	43.00	45.75	50.25	50.25
304L	....	....	43.00	....	46.75	48.25	50.25	53.25	57.75	57.75
305	24.75	32.50	37.75	....	43.00	40.75	43.00	46.25	53.50	53.50
308	26.75	34.00	42.50	....	45.50	48.25	50.50	55.00	57.50	57.50
309	34.75	44.00	51.50	....	58.50	57.50	60.50	64.25	73.50	73.50
310	42.50	53.75	69.00	....	75.50	77.50	81.50	83.25	87.00	87.00
314	....	....	....	....	....	77.50	....	83.25	....	....
316	35.25	44.50	56.25	....	63.50	63.50	66.75	70.25	74.75	74.75
316L	....	....	62.75	....	70.00	71.00	74.25	77.75	82.25	82.25
317	43.00	54.50	70.00	....	81.50	79.50	83.50	86.25	93.25	93.25
321	28.25	35.75	42.25	....	48.75	48.00	50.25	54.50	60.00	60.00
18-8CbTa	32.75	42.00	50.25	....	58.25	56.25	59.00	62.75	73.00	73.00
403	....	....	30.75	....	....	34.50	36.25	38.75	46.50	46.50
405	18.75	24.50	28.50	....	34.50	32.50	34.00	36.00	45.00	45.00
410	16.00	20.75	27.25	....	29.75	31.00	32.50	33.75	38.75	38.75
416	....	....	27.75	....	....	31.50	33.00	34.75	46.50	46.50
420	....	32.25	33.00	....	40.25	37.75	39.75	43.50	59.50	59.50
430	16.25	21.00	27.75	....	30.75	31.50	33.00	34.50	39.25	39.25
430F	....	....	28.25	....	....	32.00	33.50	35.25	49.75	49.75
431	....	27.25	35.50	....	....	39.75	41.75	43.50	53.00	53.00
446	....	....	37.75	....	56.75	42.50	44.75	46.00	67.25	80.00

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Div., H. K. Porter Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U.S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Elwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McInnes Steel Co.; McLouth Steel Corp.; Metal Forming Corp.; National-Standard Co.; National Tube Div., U.S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	33.25
304	....	34.50	....	41.50	35.25
304-L	....	37.20	....	44.65	....
316	....	38.70	....	46.65	52.25
316-L	....	45.70	....	54.35	....
316-CB	....	45.90	....	54.75	....
321	....	36.35	....	43.40	42.00
347	....	39.50	....	48.45	51.00
405	....	29.20	....	37.05	....
410	....	28.70	....	36.55	....
430	....	28.70	....	36.55	....
Inconel	45.70	54.80	63.85	73.00	....
Nickel	37.95	46.25	54.60	62.95	....
Nickel, Low Carbon	38.25	46.90	55.60	64.40	....
Monel	40.30	49.10	57.95	66.80	....
Copper*	....	....	....	....	46.00

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	33.60	41.40

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.280	Cr Hot Work	0.45-0.495
Extra Carbon	0.345	W-Cr Hot Work	0.043-0.475
Special Carbon	0.41-0.45	V-Cr Hot Work	0.460
Oil Hardening	0.450	Hi-Carbon-Cr	0.830

Grade by Analysis (%) W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	....	4.170
18.25	4.25	1	4.75	....	2.385
18	4	2	9	....	2.7575
18	4	2	....	....	1.845
18	4	1	....	....	1.680
9	3.5	..	....	....	1.275
13.5	4	3	....	....	1.945
13.75	3.75	2	5	....	2.325
6.4	4.5	1.9	....	5	1.185
6	4	3	....	6	1.430
1.5	4	1	....	8.5	1.040

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross tons, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
Alabama City, Ala. R2	58.50	59.00	....	....
Birmingham R2	58.50	59.00‡	....	....
Birmingham U6	....	59.00‡	63.00	....
Woodward, Ala. W15	58.50	59.00‡	63.00	....
Cincinnati, deld.	....	66.79	....	....
Buffalo District				
Buffalo H1, R2	62.50	63.00	63.50	64.00
Tonawanda, N.Y. W12	62.50	63.00	63.50	64.00
N. Tonawanda, N.Y. T9	....	63.00	63.50	64.00
Boston, deld.	73.79	74.29	74.79	....
Rochester, N.Y., deld.	65.52	66.02	66.52	....
Syracuse, N.Y., deld.	66.62	67.12	67.62	....
Chicago District				
Chicago I-3	62.50	63.00	63.00	63.50
Gary, Ind. U5	62.50	....	63.00	....
S. Chicago, Ill. R2	62.50	....	63.00	....
S. Chicago, Ill. Y1	62.50	63.00	63.00	....
S. Chicago, Ill. U5	62.50	....	63.00	63.50
S. Chicago, Ill. W14	62.50	....	63.00	63.50
Milwaukee, deld.	64.80	65.30	65.30	65.50
Muskegon, Mich., deld.	....	69.68	69.68	....
Cleveland District				
Cleveland R2, A7	62.50	63.00	63.00	63.50
Akron O., deld.	65.25	65.75	65.75	66.25
Mid-Atlantic District				
Bethlehem, Pa. B2	64.50	65.00	65.50	66.00
New York, deld.	....	69.01	69.51	....
Newark, deld.	67.70	68.20	68.70	69.20
Birdsboro, Pa. B10	64.50	65.00	65.50	66.00
Chester, Pa. P4	64.50	65.00	65.50	....
Philadelphia, deld.	66.26	66.76	67.26	....
Steelton, Pa. B2	64.50	65.00	65.50	66.00
Swedeland, Pa. A3	64.50	65.00	65.50	66.00
Philadelphia, deld.	66.26	66.76	67.26	67.76
Troy, N.Y. R2	64.50	65.00	65.50	66.00
Pittsburgh District				
Neville Island, Pa. P6	62.50	63.00	63.00	63.50
Pittsburgh (N&S sides), Aliquippa, deld.	....	64.45	64.45	64.98
McKeesRocks, deld.	....	64.10	64.10	64.63
Lawrenceville, Homestead, Wilmerding, Monaca, deld.	....	64.76	64.76	65.29
Verona, Trafford deld.	64.79	65.32	65.32	65.85
Brackenridge, deld.	65.10	65.60	65.60	66.13
Bessemer, Pa. U5	62.50	....	63.00	63.50
Clairton Rankin S. Duquesne, Pa. U5	62.50	....	....	....
Midland, Pa. C18	62.50	....	....	....

Youngstown District	Basic	No. 2 Foundry	Malleable	Bessemer
Hubbard, O. Y1	....	....	63.00	....
Sharpsville, Pa. S6	62.50	....	63.00	63.50
Youngstown Y1	....	....	63.00	63.50
Mansfield O., deld.	67.40	....	67.90	68.40
Duluth I-3	62.50	63.00	63.00	63.50
Erie, Pa. I-3	62.50	63.00	63.00	63.50
Everett, Mass. E1	63.25	63.75	64.25	....
Fontana, Calif. K1	70.00	70.50	....	....
Geneva, Utah C11	62.50	63.00	....	....
GraniteCity, Ill. G4	64.40	64.90	65.40	....
Ironton, Utah C11	62.50	63.00	....	....
LoneStar, Texas L6	58.50*	59.00†	....	....
Minnequa, Colo. C10	64.50	65.00	65.50	....
Rockwood, Tenn. T3	....	59.00‡	63.00	....
Toledo, O. I-3	62.50	63.00	63.00	63.50
Cincinnati, deld.	68.26	68.76	....	....

*Phos. 0.51-0.75%; Phos. 0.31-0.50%, $59.50.
†Phos. 0.51-0.75%; Phos. 0.31-0.50%, $60.
‡Phos. 0.70-0.90%; intermediate (Phos. 0.31-0.69%), $60.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.05% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.25 for each 0.5% Si; 75 cents for each 0.50% Mn over 1%)

Jackson, O. I-3, J1	71.50
Buffalo H1	72.75

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon: add $1 for each 0.5% Si to 18%; $1 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Niagara Falls, N.Y. P15	$92.50
Keokuk, Iowa, Open-hearth & Fdry, freight allowed K2	102.00
Keokuk, O.H. & Fdry, 12½ lb piglets, 16% Si, frgt allowed K2	105.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles, Tenn. T3 (Phos. 0.035% max)	$76.50
Rockwood, Tenn. T3 (Phos. 0.035% max)	76.50
Steelton, Pa. B2 (Phos. 0.035% max)	70.50
Philadelphia deld.	74.05
Troy, N.Y. R2 (Phos. 0.035% max)	70.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	67.50
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	67.50
Erie Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	67.50
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	67.50

Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: St. Paul, 25 cents; Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, San Francisco, Spokane, 10 cents; Atlanta, Houston, Seattle, no charge.

	SHEETS				STRIP	BARS				Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Merchant Qual.	H.R. Spec. Qual.	C.F. Rds.‖	H.R. Alloy 4140††		Carbon	Floor
Atlanta	8.07§	9.27§	9.83§	....	8.16	8.30	...	10.14	....	8.44	8.40	10.22
Baltimore	7.79	8.99	9.12	....	8.27	8.34	8.87	9.09[3]	15.69	8.57	8.12	9.56
Birmingham	7.68§	8.88§	8.85§	....	7.78	7.91	8.44	10.04	....	8.05	8.01	10.04
Boston	8.70	9.73	10.92	....	8.79	8.88	9.43	10.71	14.46	8.90	8.98	10.39
Buffalo	7.75	8.90	10.72	....	8.00	8.00	8.70	8.70	14.30	8.25	8.25	9.80
Chattanooga	7.90§	9.10§	9.10§	....	8.00	8.13	8.66	9.96	....	8.27	8.23	9.98
Chicago	7.70	8.90	9.70	....	7.78	7.91	8.44	8.35	13.95	8.05	8.01	9.26
Cincinnati	7.82	8.89	9.70	....	8.06	8.19	8.72	8.82	14.23	8.55	8.34	9.53
Cleveland	7.68	8.88	9.60	....	7.88	7.99	8.52	8.60	14.03	8.38	8.21	9.46
Denver	9.55	11.09	12.41	....	9.70	9.75	...	10.54	18.89	9.60	9.50	11.15
Detroit	7.91	9.13	10.02	....	8.10	8.18	8.71	8.68	14.19	8.55	8.33	9.49
Erie, Pa.	7.75	8.88	9.60[10]	....	7.90	8.00	8.65	8.70[10]	....	8.35	8.20	9.50
Houston	8.70	9.65	10.99	....	8.80	8.95	9.50	10.70	15.00	9.40	9.10	10.60
Jackson, Miss.	8.00§	9.20§	9.22§	....	8.10	8.23	8.76	10.14	....	8.37	8.33	10.08
Los Angeles	8.90	10.65	11.65	....	9.10	8.80	9.50	11.70	15.25	8.95	9.35	11.50
Milwaukee	7.82	9.02	9.82	....	7.90	8.03	8.56	8.57	14.07	8.24	8.13	9.37
Moline, Ill.	7.48	8.59	9.45	....	7.56	7.62	...	8.10	....	7.78	7.80	...
New York	8.35	9.53	10.23	57.73	8.81	8.82	9.38	10.61	14.37	8.74	8.78	10.05
Norfolk, Va.	7.85	...	...	....	8.30	8.35	...	10.80	....	8.60	8.10	9.60
Philadelphia	7.89	9.08	10.12	....	8.58	8.37	8.90	9.12	14.15	8.38	8.28	9.37
Pittsburgh	7.68	8.88	10.05	50.00	7.88	7.91	8.44	8.60	13.95	8.05	8.01	9.26
Portland, Oreg.	8.95	9.65	11.40	....	9.05	8.95	...	13.55	14.60	8.90	8.70	11.60
Richmond, Va.	8.05	...	10.09	....	8.45	8.70	9.20	10.00	....	8.80	8.35	9.70
St. Louis	8.02	9.21	10.03	....	8.11	8.25	8.78	8.93	14.28	8.48	8.34	9.59
St. Paul	7.83	8.78	9.80	....	7.91	7.97	...	8.70	....	8.13	8.15	9.42
San Francisco	8.75	10.30	10.80	....	8.95	8.80	9.35	12.30	15.25	8.85	8.85	11.15
Seattle	9.35	11.20	11.55	....	9.50	9.30	9.85	13.15	15.55	9.15	9.05	11.25
Spokane, Wash.	9.35	11.35	11.55	....	9.50	9.30	9.85	13.15	16.30	9.15	9.05	11.25
Washington	8.31	10.43	...	....	8.99	8.74	...	9.90	....	9.02	8.64	11.10

*Prices do not include gage extras; †prices include gage and coating extras (based on 12.50c zinc at Los Angeles and 13.50c at other points), except in Birmingham (coating extra excluded); ‡includes 35-cent bar quality extras; **¼-in. and heavier; ††as annealed; §42 in. and under.

Base quantities, 2000 to 4999 lb except as noted; Cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 5000 lb except in Chicago, New York and Boston, 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; [5]—400 to 999 lb; [6]—1000 to 1999 lb; [7]—2000 to 3999 lb; [10]—2000 lb and over.

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $128; Salina, Pa., $133; Niles, O., $138; Cutler, Utah, $148.

Super-Duty: Ironton, O., Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Pa., New Savage, Md., St. Louis, $165; Stevens Pottery, Ga., $175.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, O., Hawstone, Pa., $140; Warstone, Niles, Windham, O., Hays, Latrobe, Morrisville, Pa., $145; E. Chicago, Ind., Joliet, Rockdale, Ill., $150; Lehigh, Utah, $165; Los Angles, $170.

Super-Duty: Hays, Sproul, Hawstone, Pa., Niles, Warren, Windham, O., Leslie, Md., Athens, Tex., $157; Morrisville, Latrobe, Pa., $160; Curtner, Calif., $182.

Semisilica Brick (per 1000)

Clearfield, Pa., $145; Woodbridge, N. J., $128; Philadelphia, $130.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, O., $96; Clearfield, Pa., Portsmouth, O., $98.

High-Alumina Brick (per 1000)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $220; Danville, Ill., $223; Philadelphia, Clearfield, Pa., $230.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $275; Danville, Ill., $278; Philadelphia, Clearfield, Pa., $285.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $315; Danville, Ill., $318; Philadelphia, Clearfield, Pa., $325.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $177; Clearfield, Pa., $189.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $292; Clearfield, Pa., $311.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $221; Clearfield, Pa., $236.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa.; Millville W. Va., Bettsville, Millersville, Martin, Woodville, O., Gibsonburg, Narlo, O., $16; Thornton, McCook, Ill., $16.35; Dolly Siding, Bonne Terre, Mo., $15.

Magnesite (per net ton)

Domestic, dead-burned, bulk ⅛-in. grains with fines: Chewelah, Wash., $43; Luning, Nev., $43; ⅝-in. grains with fines: Baltimore, $69.40.

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $38-39; 70%, $35-36; 60%, $31-32. Imported, net tons, f.o.b. cars point of entry, duty paid metallurgical grade: European, $34; Mexican, $26.50.

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

Sponge iron:	Cents
Swedish, c.i.f., Camden, N.J., c.l. in bags	8.50
Domestic:	
F.o.b., Johnstown, Pa., Niagara Falls, N. Y., in bags	9.50
F.o.b. Riverton, N.J., in bags	8.50
Canadian, f.o.b. shipping point	9.50
Electrolytic iron:	
Melting stock, 99.9% Fe, irregular fragments of ¼ in. x 1.3 in.	24.00
Annealed, 99.5% Fe	36.50
Unannealed (99+ % Fe)	34.00
Unannealed (99+ % Fe) (minus 325 mesh)	57.00
Powder Flakes (minus 16, plus 100 mesh)	31.00
Carbonyi Iron:	
98.1-99.9%, 3 to 20 microns, depending on grade, $6.00-275.00, in standard 200-lb containers; all minus 200 mesh.	
Aluminum:	
Atomized, 500 lb, drum frght, allowed	
Carlots	36.20
Ton lots	38.20
Antimony, 500 lb lots	32.00*
Brass, 5000-lb lots	38.50-48.25†
Bronze, 5000-lb lots	59.50-63.00†
Copper:	
Electrolytic	14.25*
Reduced	14.25*
Lead	7.50*
Manganese:	
Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel, unannealed	$1.00
Nickel-Silver, 5000-lb lots	58.00-61.00†
Phosphor-Copper, 5000-lb lots	65.00
Silicon	47.50
Solder	7.00*
Stainless Steel, 302	99.00
Stainless Steel, 316	$1.32
Tin	14.50*
Zinc 5000-lb lots	19.75-33.00‡
Tungsten:	Dollars
Melting grade, 99% 66- to 200 mesh:	
1000 lb and over	4.50
Less than 1000 lb	4.65
Chromium, electrolytic 99.8% Cr min. metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 20% Zn, 10% Ni. **64% Cu, 18% Zn, 18% Ni.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches		Per
Diam	Length	100 lb
2	24	$57.75
2½	30	37.25
3	40	35.25
4	40	33.25
5⅛	40	33.00
6	60	30.00
7	60	26.75
8, 9, 10	60	26.50
12	72	25.50
14	60	25.50
16	72	24.50
17	60	25.50
18	72	24.50
20	72	24.00
24	84	24.75

CARBON

8	60	13.30
10	60	13.00
12	60	12.95
14	60	12.85
14	72	11.85
17	60	11.85
17	72	11.40
20	84	11.25
20	90	11.00
24	72, 84	11.25
24	96	10.95
30	84	11.05
40, 35	110	10.70
40	100	10.70

Imported Steel

(Base per 100 lb, landed, duty paid. Source of shipment: Western continental European countries)

	North Atlantic	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$7.30	$7.30	$7.30	$7.70
Bar Size Angles	7.11	7.11	7.11	7.51
Structural Angles	7.50	7.50	7.50	7.90
I-Beams	7.75	7.75	7.75	8.15
Plates	9.55	9.55	9.55	9.95
Sheets, H.R.	8.75	8.75	8.75	9.15
Sheets, C.R. (drawing quality)	9.10	9.10	9.10	9.45
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	27.02	27.02	27.02	30.98
Barbed Wire (†))	6.71	6.71	6.71	7.06
Merchant Bars	7.30	7.30	7.30	7.70
Hot-Rolled Bands	7.50	7.50	7.50	7.90
Wire Rods, Thomas Commercial No. 5	6.50	6.50	6.50	6.90
Wire Rods, O-H Cold Heading Quality No. 5	6.90	6.90	6.90	7.30
Bright Common Wire Nails	8.05	8.05	8.05	8.35

Oil Country Pipe: Mills withdrawn for remainder of the year.

†Per 82-lb. net, reel. §Per 100-lb kegs, 20d nails and heavier

Ores

Lake Superior Iron Ore

(Prices effective for the 1956 shipping season, gross tons, 51.50% iron natural, rail of vessel, lower lake ports.)

Old range bessemer	$11.25
Old range nonbessemer	11.10
Mesabi bessemer	11.00
Mesabi nonbessemer	10.85
Open-hearth lump	12.10
High phos.	10.85

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Dec. 1, 1955, and increases or decreases after such date are for seller's account.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

Foundry and basic 52-62% concentrates contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	25.00
N. African hematite (spot)	nom. 24.00-25.00
Brazilian iron ore 68-69%	33.00

Tungsten Ore

Net ton unit before duty

Foreign, wolframite, good commercial quality	$32.50-33.00
Domestic, scheelite, mine	63.00

Manganese Ore

Mn 48%, contracts, nominally $1.35-1.40, per long ton unit, c.i.f. U.S. ports, duty for buyer's account: 46-47%, $1.10-1.15. Spot cargoes, 10 to 15% higher.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and African

48% 3:1	$52.00-53.50
48% 2.8:1	nom. 49.00-50.00
48% no ratio	39.00-40.00

South African Transvaal

48% no ratio	$35.00-36.00
44% no ratio	25.00-26.00

Domestic

Rail nearest seller

18% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb of Mo content, mines, unpacked	$1.18

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

55-60%	$3.35-3.80
60-65%	3.80-3.90

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, furnace	$14.25-14.75
Connellsville, foundry	17.00-18.00

Oven Foundry Coke

Birmingham, ovens	$27.60
Cincinnati, deld.	32.53
Buffalo, ovens	29.50
Camden, N.J., ovens	28.50
Detroit, ovens	29.50
Pontiac, deld.	31.15
Saginaw, deld.	32.73
Erie, Pa., ovens	27.50
Everett, Mass., ovens	
New England, deld.	39.55*
Indianapolis, ovens	28.75
Ironton, O., ovens	28.60
Cincinnati, deld.	28.25
Kearny, N.J., ovens	28.75
Lone Star, Tex., ovens	25.50
Milwaukee, ovens	29.50
Painesville, O. ovens	29.50
Cleveland, deld.	31.55
Philadelphia, ovens	28.50
St. Louis, ovens	28.50
Neville Island (Pittsburgh), Pa., ovens	28.25
St. Paul, ovens	28.50
Chicago, deld.	31.82
Swedeland, Pa. ovens	28.50
Terre Haute, Ind., ovens	28.75

*Or within $4.55 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.00
Toluene, one deg.	32.00-34.00
Industrial xylene	32.00-35.00

Per ton, bulk, ovens

Ammonium sulfate	$32.00

Cents per pound, producing point

Phenol: Grade 1, 15.00; Grade 2-3, 14.50; Grade 4, 16.50; Grade 5, 15.25.

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton Pa. 21-23% Mn, $102; 19-21% Mn, 1-3% Si, $99.50; 16-19% Mn, $97.50

Standard Ferromanganese: (Mn 74-76%, C 7% approx.) Base price per net ton $215, Johnstown, Pa.; $235, Duquesne, Sheridan, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.

(Mn 79-81%). Lump $223 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 33.75c per lb of contained Mn, carload packed 35.05c, ton lots 36.55c, less ton 37.75c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.30% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk 24.15c per lb of contained Mn, packed, carload 24.45c, ton lot 27.05c, less ton 28.25c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max). Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lots 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 33c; 2000 lb to min carload, 35c; 500 lb to 1999 lb, 37c; 50 lb cans, 37.5c. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 12.95c per lb of alloy. Packed, c.l. 14.15c, ton 14.60c, less ton 15.6c, f.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract ton lot 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton $1.37 f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 27.75c per lb of contained Cr; c.l. packed 29.3c, ton lot 31.05c; less ton 32.45c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-71%). Contract, carload, lump, bulk, C 0.025% max (Simplex) 34.75c per lb contained Cr, 0.02% max 41.5c, 0.03% max 41c, 0.06% max 39.5c, 0.1% max 39c, 0.15% max 38.75c, 0.2% max 38.5c, 0.5% max 38.25c, 1.0% max 37.5c, 1.5% max 37.35c, 2.0% max 37.25c. Ton lot, add 3.4c, less ton add 5.1c. Carload packed add 1.75c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l. 2 in. x D, bulk 29.05c per lb contained Cr. Packed, c.l. 30.65c, ton 32.45c, less ton 33.95c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 29-32%, C 1.25% max). Contract, carload, packed 8 M x D, 20.85c, per lb of alloy, ton lot 22.10c; less ton lot 23.3c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome-Silicon: (Cr 39-41%, Si 42-49%, C 0.06% max). Contract, carload, lump, 4" x down and 2" x down, bulk, 41.35c per lb of contained Cr; 1" x down, bulk 42.35c. Delivered.

Chromium Metal, Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2% max). Contract, carlot, packed 2" x D plate (about ¼" thick) $1.29 per lb, ton lots $1.31; less ton lots $1.33. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 50-55%, Si 8% max., C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed, 21.40c; ton lot 22.50c f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si. Packed, c.l. 16c, ton lot 17.45c, less ton 19.1. F.o.b. Alloy, W. Va., Ashtabula, Marietta, O., Sheffield, Ala., and Portland, Oreg. Spot, add 0.45c.

Low Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk 15.25c per pound contained silicon. Packed, c.l. 17.25c, ton lot, 19.05c; less ton, 20.4c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 16.4c per lb of contained Si. Packed, c.l. 18.30c, ton lot 19.95c, less ton 21.2c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 19.5c per lb of contained Si. Packed, c.l. 21.15c, ton lot 22.55c, less ton 23.6c. Delivered. Spot, add 0.25c.

Silicon Metal: (Mn 98% Si, 0.75% max Fe, 0.07% max Ca), C.l. lump, bulk 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Deduct 0.5c for max 2% Fe grade analyzing min 96.5% Si. Spot, add 0.25c.

Alnifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy, ton lot, packed, 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 27.25c per lb of alloy, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per pound; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5%-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%). Contract, lump, carloads 9.5c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%; Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3¾ lb each and containing 2 lb of Cr). Contract carload, bulk, 19c per lb of briquet, carload packed in box pallets 19.2c, in bags 20.1c; 3000 lb to c.l. in box pallets 20.4c; 2000 lb to c.l. in bags, 21.3c; less than 2000 lb in bags 22.2c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing 2 lb of Mn). Contract, carload, bulk 13.9c per lb of briquet, c.l. packed, pallets 14.1c bags 15.1c; 3000 lb to c.l., pallets 15.3c; 2000 lb to c.l. bags, 16.3c, less ton 17.2c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 14.4c per lb of briquet, c.l. packed, pallets, 14.6c; bags 15.6c, 3000 lb to c.l., pallets, 15.8c; 2000 lb to c.l., bags 16.8c; less ton 17.7c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing 2 lb of Si). Contract, carload, bulk 7.55c per lb of briquet, packed, pallets, 7.75c; bags 8.75c; 3000 lb to c.l., pallets 9.35c; 2000 lb to c.l. bags 10.35c; less ton 11.25c. Delivered. Spot, add 0.25c. (Small size—Weighing approx. 2½ lb and containing 1 lb of Si). Carload, bulk 7.7c. Packed, pallets 7.9c; bags 8.9c; 3000 lb to c.l. pallets 9.5c; 2000 lb to c.l. bags 10.5c; less ton 11.4c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.41 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 5000 lb W or more $3.45 per lb of contained W; 2000 lb W to 5000 lb W, $3.55; less than 2000 lb W, $3.67. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.4% max). Contract, ton lot, 2" x D, $6.90 per lb of contained Cb. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D. $4.95 per lb of contained Cb plus Ta, delivered; less ton lots $5.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.) Contract, c.l. packed ½-in. x 12 M, 19c per lb of alloy, ton lots 20.15c, less ton 21.4c. Delivered. Spot, add 0.25c.

Graphidox No. 5: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 19c per lb of alloy, ton lots 20.15c; less ton lots 21.4c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis..

V-3 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.1c per lb of alloy; ton lots 19.55c; less ton lots 20.8c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 17.50c. Packed c.l. 18.50c, 2000 lb to c.l. 19.50c, less than 2000 lb 20c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base); carload, f.o.b. sellers' works. Mt. Pleasant, Siglo, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, in 200-lb containers, f.o.b. Langeloth, and Washington, Pa., $1.68 in all sizes except powdered which is $1.74.

Technical Molybdic-Oxide: Per lb contained Mo, in cans, $1.39; in bags, $1.38, f.o.b. Langeloth and Washington, Pa.

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(*Concluded from page 142*)

ons composite steel girder, Horace Harding expressway extension, Nassau county, New York; bids Oct. 18, Albany, N. Y.

250 tons, warehouse, J. B. Van Sciver Co., Jenkintown, Pa.; bids asked.

190 tons, Washington state railway highway bridge, Thurston county; general award to John E. Alexander, Seattle, low at $151,664.

185 tons, three state highway bridges, Freeport, Me.; W. H. Hinman Inc., North Anson, Me., low, general contract; also 135 tons reinforcing bars.

165 tons, five state highway bridges, Spaulding turnpike, Rochester, N. H.; Frank Palazzi & Sons Inc., Johnston, R. I., low, general contract; also 280 tons, reinforcing bars.

125 tons, state highway bridge, Williamstown, Mass.

120 tons, new lock gates and lowering lower sill, lock 18, near Herkimer, N. Y.; bids Oct. 18, Albany, N. Y.

115 tons, including 37 tons reinforcing bars, WF beam bridge, Vershire, Vt.

100 tons, repairs, lock 11, Erie canal, Amsterdam, N. Y.; bids Oct. 18, Albany, N. Y.

100 tons plus, Boeing construction, Renton, Wash.; bids in.

REINFORCING BARS . . .

REINFORCING BARS PLACED

375 tons, dormitory buildings, Texas Christian University, Ft. Worth, Tex., to North Texas Steel Co., Ft. Worth; James T. Taylor & Son Inc., Ft. Worth, general contractor.

200 tons, First National Stores warehouse, East Providence, R. I., to Plantations Steel Co., Providence (bars), and Rumford Steel Products Inc. (structurals); Gilbane Building Co., Providence, general contractor.

105 tons, dormitory, Wheaton College, Norton, Mass., to Northern Steel Inc., Medford, Mass. (85 tons of bars) and Security Steel & Wire Works, Boston, structurals; C. C. Temple Construction Co. Inc., Boston, general contractor.

REINFORCING BARS PENDING

2000 tons, construction at Ft. Lewis, Wash.; general bids in.

565 tons, Catholic senior high school, Levittown, Pa., McCloskey & Co., Philadelphia, awarded general contract.

320 tons, Washington state two girder overcrossings, Thurston county; general contract to T. T. Burnham Co., Seattle, low at $247,640.

300 tons, 5-story class room, Seattle University; general contract to Cawdrey & Vemo, Seattle, low at $719,510.

280 tons, Philadelphia Gas Works, Philadelphia, Fleming & Co., that city, general contractor.

250 tons, Washington state highway girder bridge, Okanogan county; general contract to Cherf Bros. & Sandkay Inc., Ephrata, Wash., low at $306,116.

200 tons, Washington state, two highway bridges, Thurston county; general contract to Northwest Construction Co., Seattle, low at $706,233.

150 tons, three rigid frame highway bridges, Washington state project; bids to Olympia, Wash., postponed from Oct. 9 to Oct. 16.

120 tons, municipal sewage project, Philadelphia, Meehan & Co., contractor.

100 tons, two bridges, 180 and 175 ft long, Douglas county, Oreg.; bids to Bureau of Public Roads, Portland, Oreg., Oct. 9.

90 tons, third phase Eagle Gorge railroad relocation; bids to U. S. Engineer, Seattle, Oct. 29.

PLATES . . .

PLATES PENDING

1000 tons or more, additional tankage for pulp mill, Toledo, Oreg.

300 tons, 3-million-gal steel welded water tank; Hammond Iron Works, Provo, Utah, low at $113,305 to Alderwood Manor, Wash.

260 tons, Aberdeen Proving Ground, Aberdeen, Md.

PIPE . . .

CAST IRON PIPE PENDING

300 tons, various sizes for system additions; bids to Seattle Oct. 3 and 10.

RAILS, CARS . . .

LOCOMOTIVES PLACED

American Refrigerator Transit Co., 300 refrigerator cars, to Pacific Car & Foundry Co., Renton, Wash.

Lehigh & New England, 400 seventy-ton covered hoppers; Greenville Steel Car Co., Greenville, Pa., awarded 200, and Pullman-Standard Car Mfg. Co., Chicago, and ACF Industries Inc., New York, 100 each.

Gulf, Mobile & Ohio, 600 freight cars, 250 wood rack cars, going to its own shops in Meriden, Miss., 250 boxcars to Pullman-Standard Car Mfg. Co., Chicago, and 100 covered hoppers to the Greenville Steel Car Co., Greenville, Pa.

Butte, Anaconda & Pacific, 200 seventy-five-ton flat-bottom ore cars to Pullman-Standard Car Mfg. Co., Chicago.

Lake Superior & Ishpeming, 200 seventy-ton ore cars, to the Bethlehem Steel Co., Bethlehem, Pa.

Rutland, 25 seventy-ton gondolas, and 50 fifty-ton boxcars to the Pullman-Standard Car Mfg. Co., Chicago.

Baltimore & Ohio, two trains, each comprising three rail diesel cars, to the Budd Co., Philadelphia.

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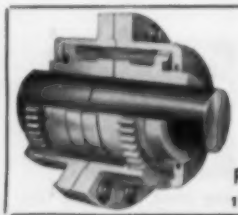

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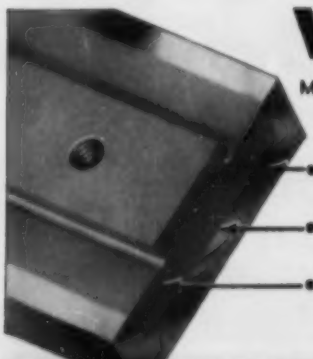

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Scrap Prices Still Declining

Market on steelmaking grades settles lower with mill buying limited. Undertone strong, supported by assurances of high level steel operations the rest of the year

Scrap Prices, Page 158

Philadelphia—Steel scrap prices continue to fall. Some trade leaders regard this as temporary. They point out that dealers' yards are still barren of scrap, and that there are no signs of early easing in steelmaking operations.

No. 1 heavy melting steel, No. 1 bundles and No. 1 busheling are now holding at $56-$57, delivered; No. 2 heavy melting at $48; and No. 2 bundles at $45-$47. Electric furnace bundles have dropped $1 to $60 delivered.

While mixed borings and turnings are unchanged, machine shop turnings are lower at $40, delivered; short shoveling turnings at $44; and heavy turnings at $52. Low phos structurals and plates have eased to $61-$62, and couplers, springs and wheels to $68-$70.

No. 1 cupola cast is lower at $53, delivered; heavy breakable cast at $56; and drop broken machinery at $58. Malleable is unchanged at $68.

New York — Brokers' buying prices generally are unchanged, although the market undertone is somewhat easier. Only exception is stainless steel scrap, with 18-8 borings and turnings higher at $200-$210, delivered.

Boston—Steel scrap prices continue to show strength following a mild reaction. Brokers are paying $51 for No. 1 heavy melting steel, shipping point, district shipment, off only 50 cents from the peak. Prices are somewhat lower for eastern Pennsylvania delivery. For unprepared No. 1 steel, dealers pay a spread of $2 a ton, up to $37 at yard. Shipments are moderately slower.

Pittsburgh—Prices on the prime steelmaking grades of scrap are unchanged, but the No. 2 grades are quoted down $2 a ton, with No. 2 heavy melting $48-$49, and No. 2 bundles $45-$46. Machine shop turnings, mixed borings and turnings, short shovel turnings, cast iron borings and railroad specialties are quoted $1 down from a week ago.

Except for one purchase by a mill some distance from the Pittsburgh area proper, the market was inactive last week. This purchase included No. 1 steel at $60, No. 2 at $49 and No. 2 bundles at $46.

Chicago—Prices on steelmaking

(*Please turn to page* 161)

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Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Oct. 3	$57.00
Oct. 26	58.17
Sept. Avg.	59.08
Oct. 1955	45.17
Oct. 1951	43.60

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	56.00-57.00
No. 2 heavy melting	*48.00-49.00*
No. 1 bundles	56.00-57.00
No. 2 bundles	*45.00-46.00*
No. 1 busheling	56.00-57.00
Machine shop turnings	*18.00-19.00*
Mixed borings, turnings	*18.00-19.00*
Short shovel turnings	*42.00-43.00*
Cast iron borings	*42.00-43.00*
Cut structurals, 3 ft lengths	67.00-68.00
Heavy turnings	53.00-54.00
Punchings & plate scrap	67.00-68.00
Electric furnace bundles	67.00-68.00

Cast Iron Grades

No. 1 cupola	54.00-55.00
Heavy breakable cast	49.00-50.00
Unstripped motor blocks	36.00-37.00
No. 1 machinery cast	58.00-59.00

Railroad Scrap

No. 1 R.R. heavy melt.	68.00-69.00
Rails 2 ft and under	78.00-79.00
Rails 18 in. and under	79.00-80.00
Rails random lengths	75.00-76.00
Railroad specialties	*73.00-74.00*

Stainless Steel Scrap

18-8 bundles & solids	395.00-405.00
18-8 turnings	275.00-290.00
430 bundles & solids	110.00-120.00
430 turnings	60.00-65.00

CLEVELAND

No. 1 heavy melting	62.50-63.50
No. 2 heavy melting	44.00-45.00
No. 1 bundles	62.50-63.50
No. 2 bundles	40.00-41.00
No. 1 busheling	62.50-63.50
Machine shop turnings	33.50-33.50
Mixed borings, turnings	36.50-37.50
Short shovel turnings	36.50-37.50
Cast iron borings	36.50-37.50
Low phos.	62.50-63.50
Cut structural plates 2 ft and under	68.00-69.00
Alloy free, short shovel turnings	43.00-44.00
Electric furnace bundles	62.50-63.50

Cast Iron Grades

No. 1 cupola	57.00-58.00
Charging box cast	50.00-51.00
Heavy breakable cast	48.00-49.00
Stove plate	54.00-55.00
Unstripped motor blocks	36.00-37.00
Brake shoes	44.00-45.00
Clean auto cast	56.00-57.00
Burnt cast	43.00-44.00
Drop broken machinery	59.00-60.00

Railroad Scrap

No. 1 R.R. heavy melt.	68.00-69.00
R.R. malleable	70.00-71.00
Rails, 2 ft and under	83.00-84.00
Rails, 18 in. and under	84.00-85.00
Rails, random lengths	80.00-81.00
Cast steel	69.00-70.00
Railroad specialties	74.00-75.00
Uncut tires	73.00-74.00
Angles, splice bars	75.00-76.00
Rails, rerolling	82.00-83.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	380.00-390.00
18-8 turnings	260.00-260.00
430 clips, bundles, solids	100.00-110.00
430 turnings	50.00-60.00

YOUNGSTOWN

No. 1 heavy melting	*64.00-65.00*
No. 2 heavy melting	47.00-48.00
No. 1 bundles	*64.00-65.00*
No. 2 bundles	43.00-44.00
No. 1 busheling	*64.00-65.00*
Machine shop turnings	34.00-35.00
Short shovel turnings	38.00-39.00
Cast iron borings	38.00-39.00
Low phos.	65.00-66.00
Electric furnace bundles	*64.00-65.00*

Railroad Scrap

No. 1 R.R. heavy melt.	66.00-67.00

CHICAGO

No. 1 heavy melting	*56.00-60.00*
No. 2 heavy melting	*46.00-47.00*
No. 1 factory bundles	*63.00-64.00*
No. 1 dealer bundles	*56.00-57.00*
No. 2 bundles	43.00-44.00
No. 1 busheling	*56.00-60.00*
Machine shop turnings	36.00-37.00
Mixed borings, turnings	*37.00-38.00*
Short shovel turnings	*37.00-38.00*
Cast iron borings	*37.00-38.00*
Cut structurals, 3 ft	*66.00-67.00*
Punchings & plate scrap	*67.00-68.00*

Cast Iron Grades

No. 1 cupola	*51.00-52.00*
Stove plate	47.00-48.00
Unstripped motor blocks	*40.00-41.00*
Clean auto cast	*56.00-57.00*
Drop broken machinery	*56.00-57.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*62.00-63.00*
R.R. malleable	71.00-72.00
Rails, 2 ft and under	81.00-82.00
Rails, 18 in. and under	82.00-83.00
Angles, splice bars	73.00-74.00
Rails, rerolling	*82.00-84.00*

Stainless Steel Scrap

18-8 bundles & solids	450.00-470.00
18-8 turnings	350.00-370.00
430 bundles & solids	70.00-75.00
430 turnings	52.50-57.50

DETROIT

Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	55.00
No. 2 heavy melting	43.00
No. 1 bundles	56.00
No. 2 bundles	39.00
No. 1 busheling	55.00
Machine shop turnings	30.00
Mixed borings, turnings	33.00
Short shovel turnings	34.00
Punchings & plate scrap	60.00

Cast Iron Grades

No. 1 cupola	48.00
Charging box cast	41.00
Stove plate	42.00
Heavy breakable	41.00
Unstripped motor blocks	32.00
Clean auto cast	53.00
Malleable	52.00

BIRMINGHAM

No. 1 heavy melting	42.00-43.00
No. 2 heavy melting	40.00-41.00
No. 1 bundles	42.00-43.00
No. 2 bundles	34.00-35.00
No. 1 busheling	42.00-43.00
Cast iron borings	25.00-26.00
Short shovel turnings	35.00-36.00
Machine shop turnings	33.00-34.00
Bar crops and plate	59.00-60.00
Structural & plate, 2 ft	57.00-58.00
Electric furnace bundles	53.00-54.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	53.00-54.00
Stove plate	51.00-52.00
Unstripped motor blocks	45.00-46.00
Charging box cast	40.00-41.00
No. 1 wheels	45.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt.	*56.00-57.00*
Rails, 18-in. and under	74.00-75.00
Rails, rerolling	77.00-78.00
Rails, random lengths	69.00-70.00
Angles, splice bars	68.00-69.00

PHILADELPHIA

No. 1 heavy melting	*56.00-57.00*
No. 2 heavy melting	*48.00*
No. 1 bundles	*56.00-57.00*
No. 2 bundles	*45.00-47.00*
No. 1 busheling	*56.00-57.00*
Electric furnace bundles	*60.00*
Mixed borings, turnings	41.00
Machine shop turnings	*40.00*
Short shovel turnings	*44.00*
Heavy turnings	*52.00*
Structurals & plates	*61.00-62.00*
Couplers, springs, wheels	*68.00-70.00*
Rail crops, 2 ft & under	76.00-77.00

Cast Iron Grades

No. 1 cupola	*53.00*
Malleable	68.00
Heavy breakable cast	*56.00*
Drop broken machinery	*58.00*

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	52.00-53.00
No. 2 heavy melting	42.00-43.00
No. 1 bundles	52.00-53.00
No. 2 bundles	40.00-41.00
Machine shop turnings	32.00-33.00
Mixed borings, turnings	31.00-32.00
Short shovel turnings	37.00-38.00
Low phos. (structural & plate)	54.00-55.00

Cast Iron Grades

No. 1 cupola	46.00-47.00
Unstripped motor blocks	36.00-37.00
Heavy breakable	48.00-48.50

Stainless Steel

18-8 sheets, clips, solids	350.00-360.00
18-8 borings, turnings	*200.00-210.00*
430 sheets, clips, solids	115.00-120.00
410 sheets, clips, solids	105.00-110.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*48.00-49.00*
No. 2 heavy melting	*37.00-38.00*
No. 1 bundles	*48.00-49.00*
No. 2 bundles	*35.00-36.00*
No. 1 busheling	*48.00-49.00*
Machine shop turnings	29.00-30.00
Mixed borings, turnings	31.00-32.00
Short shovel turnings	*32.00-33.00*
No. 1 cast	44.00-44.50
Mixed cupola cast	39.50-40.00
No. 1 machinery cast	45.50-46.00

BUFFALO

No. 1 heavy melting	57.00-58.00
No. 2 heavy melting	45.00-46.00
No. 1 bundles	57.00-58.00
No. 2 bundles	42.00-43.00
No. 1 busheling	57.00-58.00
Mixed borings, turnings	34.00-35.00
Machine shop turnings	31.00-32.00
Short shovel turnings	35.00-36.00
Cast iron borings	34.00-35.00
Low phos.	60.00-61.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	49.00-50.00
No. 1 machinery	54.00-55.00

Railroad Scrap

Rails, random lengths	71.00-72.00
Rails, 3 ft and under	77.00-78.00
Railroad specialties	68.00-69.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*56.00-57.00*
No. 2 heavy melting	*45.00-46.00*
No. 1 bundles	*56.00-57.00*
No. 2 bundles	*41.00-42.00*
No. 1 busheling	*56.00-57.00*
Machine shop turnings	*35.00-36.00*
Mixed borings, turnings	37.00-38.00
Short shovel turnings	*39.00-40.00*
Cast iron borings	37.00-38.00
Low phos., 18 in.	62.00-63.00

Cast Iron Grades

No. 1 cupola	48.00-49.00
Heavy breakable cast	47.00-48.00
Charging box cast	48.00-49.00
Drop broken machinery	58.00-59.00

Railroad Scrap

No. 1 R.R. heavy melt.	62.00-63.00
Rails 18 in. and under	77.00-78.00
Rails random lengths	68.00-69.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	53.00
No. 2 heavy melting	45.00
No. 1 bundles	53.00
No. 2 bundles	41.00
No. 1 busheling	53.00
Machine shop turnings	32.00
Short shovel turnings	36.00

Cast Iron Grades

No. 1 cupola	50.00
Charging box cast	*45.00*
Heavy breakable cast	*45.00*
Unstripped motor blocks	*45.00*
Brake shoes	51.00
Clean auto cast	54.00
Stove plate	*42.50*

Railroad Scrap

No. 1 R.R. heavy melt.	63.50
Rails, 18 in. and under	82.00
Rails, rerolling	*90.00*
Rails, random lengths	79.00
Angles, splice bars	*66.00*

SEATTLE

No. 1 heavy melting	50.00
No. 2 heavy melting	46.00
No. 1 bundles	42.00
No. 2 bundles	31.00
Machine shop turnings	25.00-27.00
Mixed borings, turnings	25.00-27.00
Electric furnace No. 1	58.00-60.00

Cast Iron Grades

No. 1 cupola	46.00-48.00
Heavy breakable cast	42.00-44.00
No. 1 wheels	37.00
Unstripped motor blocks	44.00
Stove plate (f.o.b. plant)	35.00-37.00

LOS ANGELES

No. 1 heavy melting	50.00
No. 2 heavy melting	47.00
No. 1 bundles	48.00
No. 2 bundles	40.00
Machine shop turnings	29.00

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	46.00

SAN FRANCISCO

No. 1 heavy melting	*52.00*
No. 2 heavy melting	*48.00*
No. 1 bundles	48.00
No. 2 bundles	*43.00*
Machine shop turnings	30.00
Mixed borings, turnings	30.00
Cast iron borings	30.00
Heavy turnings	30.00
Short shovel turnings	33.00
Cut structurals	58.00

Cast Iron Grades

No. 1 cupola	55.00
Charging box cast	45.00-47.00
Stove plate	48.00
Heavy breakable cast	42.00
Unstripped motor blocks	47.00
Clean auto cast	55.00
No. 1 wheels	45.00-47.00
Drop broken machinery	55.00

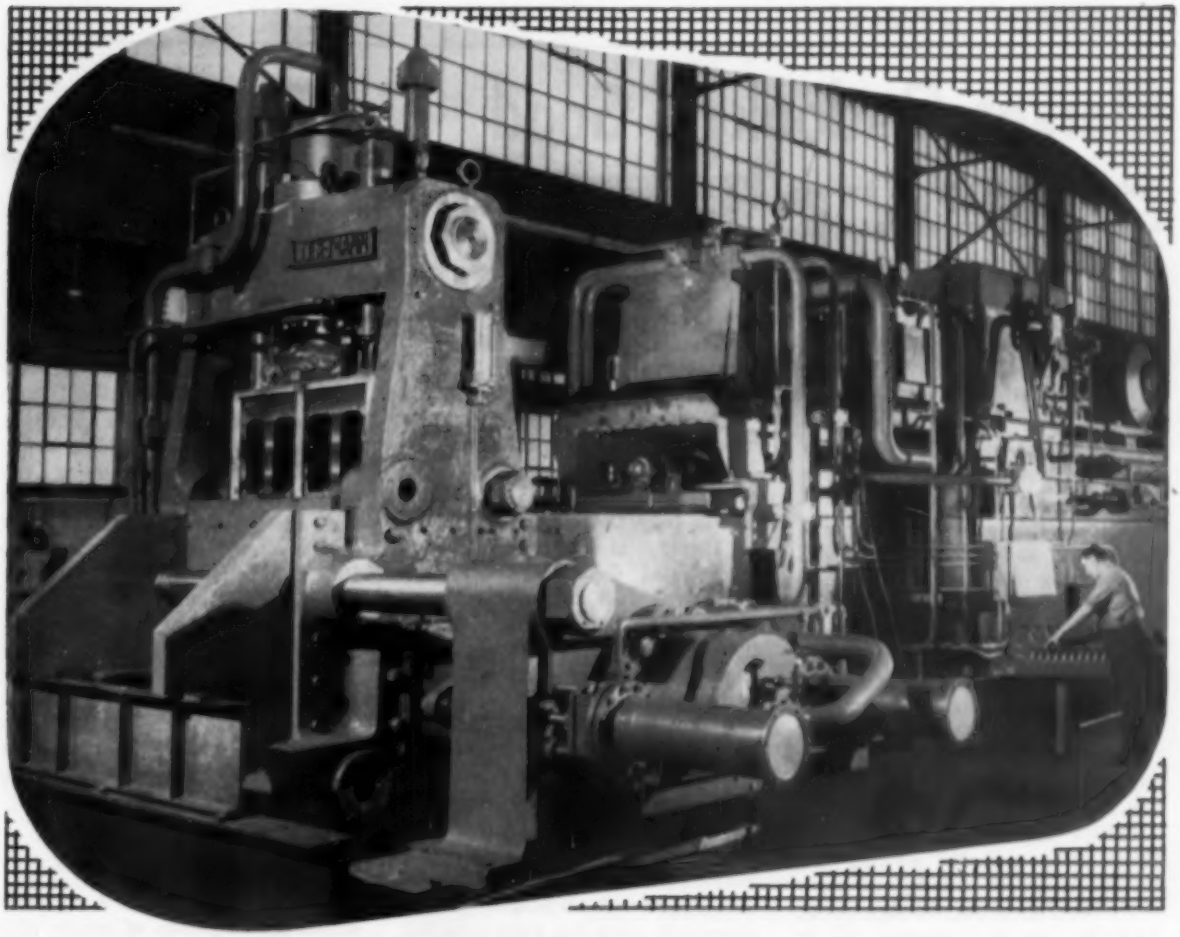
HAMILTON, ONT.

No. 1 heavy melting	52.00
No. 2 heavy melting	47.00
No. 1 bundles	52.00
No. 2 bundles	42.50
Mixed steel scrap	46.00
Busheling, new factory: Prepared	50.00
Unprepared	46.00
Short steel turnings	34.00

Cast Iron Grades†

No. 1 machinery cast	50.00

†F.o.b., Hamilton, Ont.



A New LOGEMANN Triple Compression METAL BALING PRESS

★ COMPLETELY AUTOMATIC ★ MINIMUM INSTALLATION COST ★ TOP FILL
★ BOTTOM DISCHARGE CLEANS BOX EVERY BALE ★ RECORDS SHOW A
50 TO 55 TON SUSTAINED HOURLY OUTPUT OF HIGH DENSITY BALES

To meet the demands of modern automobile and body plants for automation, LOGEMANN has installed a number of these new type scrap presses for baling unprecedented tonnages of steel sheet-scrap. This unit can be adapted to other types of plants and other sheet metals with some modifications to suit the conditions and requirements of the user.

Hydraulic pressure for the operation of the main press rams is generated by two 150 H.P. opposed-cylinder pumps. One of the features of this bottom-drop press is the fact that loose chips, small slivers and punchings are cleared from the press box with each bale, instead of being retained within the box to possibly cause interference on subsequent bales.

OPERATION IS ENTIRELY AUTOMATIC. The supervising operator, with his electrical control-board, can be remotely located. In some cases, a closed circuit television screen is used to show operator the loading of press and hopper.

It will pay you to investigate the merits of this new unit. When making your inquiry, please give us the amount of tonnage required, and the nature of your scrap.

Write for further details.

LOGEMANN BROTHERS CO.

3126 W. BURLEIGH STREET • MILWAUKEE 10, WISCONSIN

Market Outlook Is Good

Sales are still spotty, but a few fabricators are beginning to order substantial tonnages of nonferrous metals. Optimism for fourth quarter is running high

Nonferrous Metal Prices, Pages 160 & 161

FOURTH QUARTER demand for nonferrous metals may be starting in earnest. While only a few companies are letting substantial orders, producers report that copper, lead, zinc and aluminum sales are showing daily improvement.

Copper—Custom smelters, selling at the 39 cent a pound level, are smiling because of increased demand. While Detroit may not enter the market for another week or two, there are definite indications that the market is strengthening. Primary producers continue to quote 40 cents a pound.

Wire mills are operating at peak capacities, but a few copper men are beginning to admit that order backlogs are slipping slightly. Brass mills are still waiting for motordom to let orders, but sales are showing a day-by-day gain. Explains one spokesman: "It is nothing to get excited about yet, but the market is becoming much firmer than it has been for the last two months."

Crux: Copper sales should be climbing by the middle of the month unless automotive producers continue to hold off—waiting to see what reaction new models receive.

Lead—Sales are good to excellent. Strength in the construction, battery and gasoline industries is helping to keep the market firm at 16 cents a pound. Across-the-board sales are creeping up.

Zinc — Galvanizers are adding strength to the market, but diecasters are still hesitant to buy substantial tonnages. Reason: Orders from Detroit are still being let slowly. It may be November before zinc diecasters begin operating at full tilt. A few are starting the ball rolling, entering the market for substantial tonnages. The price remains firm at 13.50 cents per pound.

Aluminum — Extruders are getting more orders from Uncle Sam. Mill sales are crawling up, and confidence in a record fourth quarter is mounting.

Note: The new Forrestal class aircraft carrier—the *USS Ranger*—is equipped with about 1000 tons of aluminum, says the Aluminum Co. of America.

Tungsten Prospects

"Probably the greatest potential application for metallic tungsten lies in the field of alloy steels such as high-speed cutting tools and high temperature alloys," says W. Lunsford Long, president, Tungsten Institute. He adds: "The present government stockpile will dwindle like snow in May under the impact of increasing use of tungsten in jet engines for the aircraft, atomic energy and guided missile programs."

Tin Buyers Cautious

Production and consumption of tin are about equal. This should continue through the fourth quarter and keep the price at least at the 99 cent a pound level. The current price is about $1.03 a pound. Buyers are making hand-to-mouth purchases, hoping the price will drop further. Remember, when the U.S. Texas City tin smelter closes on Jan. 31, 1957, its concentrates will be released for use on the open market. Tin users feel that the extra concentrates may force tin prices down. As the year gets deeper into the fourth quarter, many users will hesitate to order for February delivery until they see what effect the extra tin concentrates will have on the world market.

Nickel Queries Fade

All the hoopla about a congressional investigation of nickel production and distribution practices is fading as Senators and Congressmen hurry home to campaign for re-election, including Sen. Joseph C. O'Mahoney (Dem., Wyo.), a leading advocate for an investigation earlier in the year.

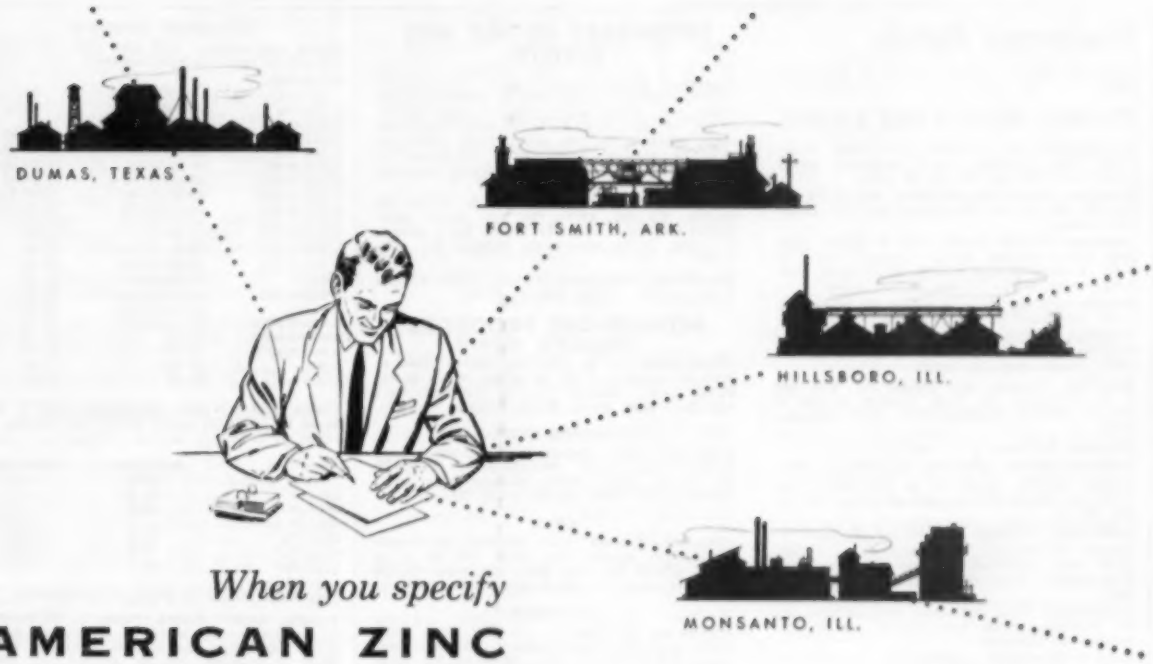
Market Memos

- Titanium sales continue at record breaking levels. Most fabricators are booked solidly through at least the first quarter of 1957. Military uses for mill products are multiplying.
- The Magnesium Association reports that the 26 per cent increase in mill product shipments from July to August (1001 tons vs. 1262 tons) indicates the growing use of the metal in structural applications. August totals were 45 per cent above the 871 tons shipped in August, 1955. Predicts the association: Mill shipments for the first nine months of this year will about equal last year's 12-month record total.

NONFERROUS PRICE RECORD

	Price Oct. 3	Last Change		Previous Price	Sept. Avg.	Aug. Avg.	Oct., 1955 Avg.
Copper	39.00-40.00	Aug.	22, 1956	39.50-40.00	39.500	39.750	44.584
Lead	15.80	Jan.	13, 1956	16.30	15.800	15.800	15.300
Zinc	13.50	Jan.	6, 1956	13.00	13.500	13.500	13.020
Tin	103.375	Oct.	2, 1956	102.875	103.745	99.043	96.230
Nickel	64.50	Nov.	24, 1954	60.00	64.500	64.500	64.500
Aluminum	27.10	Aug.	10, 1956	26.90	27.100	26.700	24.400
Magnesium	35.25	Aug.	13, 1956	33.75	35.250	34.694	32.500

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99 + %, deld.; MAGNESIUM, pig, 99.8%, Velasco, Tex.



When you specify

AMERICAN ZINC

you have

4

SOURCES OF SUPPLY

Not just one, but four American Zinc plants are at your service. Under normal conditions each of these plants is prepared to make immediate delivery of slab zinc. If, for any reason one of the plants is unable to fill your order, another one will.

To further assure prompt delivery, and to keep pace with growing demand, production of all grades of zinc, from Prime Western to Electrolytic, has been increased.

You can always count on American Zinc to fill your needs with speed and precision.

HERE'S WHY WE CAN SERVE YOU BETTER

PLANT	BRAND	GRADE
DUMAS, TEXAS	GRANBY D	Prime Western Select Brass Special Continuous Line Galvanizing Grades
FORT SMITH, ARK.	GRANBY A AMERICAN SPECIAL	Prime Western Brass Special
HILLSBORO, ILL.	GRANBY H	High Grade Intermediate Brass Special Prime Western Continuous Line Galvanizing Grades
MONSANTO, ILL.	AMERICAN ELECTROLYTIC	Special High Grade High Grade Special Alloys and Shapes Continuous Line Galvanizing Grades

American Zinc Sales Company

Distributors for AMERICAN ZINC, LEAD & SMELTING COMPANY

COLUMBUS, OHIO • CHICAGO • ST. LOUIS • NEW YORK

Nonferrous Metals

Cents per pound, carlots, except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99 + %, ingots, 27.10; pigs, 25.00, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 28.90; No. 43, 28.70; No. 195, 30.30; No. 214, 30.50; No. 356, 28.90. 50-lb ingots.

Antimony: R.M.M. brand, 99.5%, 33.00; Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.50-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 97-99%, $2.60 per lb for 550-lb keg; $2.63 per lb for 100-lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $119.20 per lb, nom.

Copper: Electrolytic, 40.00 deld. Conn. valley; 40.00 deld. Midwest; custom smelters, 39.00 deld.; lake, 40.00 deld.; fire refined, 39.75 deld.

Germanium: First reduction, $291.85-$220 per lb; intrinsic grade, $230-$242.67 per lb, depending on quantity.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $90-$110 nom. per troy oz.

Lead: Common, 15.80; chemical, 15.90; corroding, 15.90, St. Louis. New York basis, add 0.20.

Lithium: 98 + %, cups or ingots, $11.50; rod $13.50; shot or wire, $14.50, f.o.b. Minneapolis, 100 lb lots.

Magnesium: Pig, 35.35; ingot, 36.00, f.o.b. Velasco, Tex. 13 in. sticks, 39.00, f.o.b. Madison, Ill.

Magnesium Alloys: AZ91B (diecasting), 37.25 deld.; AZ63A, AZ92A, AZ91C (sand castings), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $255-$257 per 76-lb flask.

Molybdenum: Extruded ingot, $9.60 per pound, f.o.b. Detroit.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 64.50; 10-lb pigs, unpacked, 67.65; "XX" nickel shot, 69.00; "F" nickel shot or ingots for addition to cast iron, 64.50; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $50-$100 per troy oz, nom.

Palladium: $23-$24 per troy oz.

Platinum: $103-$108 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $118-$125 per troy oz.

Ruthenium: $45-$55 per troy oz.

Selenium: 99.5%, $13.50-$15.00 per lb.

Silver: Open market, 90.875 per troy oz.

Sodium: 16.50, c.l.; 17.00, l.c.l.

Tantalum: Sheet, rod, $88.70 per lb; powder, $56.63 per lb.

Tellurium: $1.50-$1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N.Y., spot, 103.375; prompt, 103.00.

Titanium: Sponge, 99.5 + %, grade A-1 ductile (0.3% Fe max), $3.00; grade A-2 (0.5% Fe max), $2.70 per pound.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $4.50 per lb, nom, f.o.b. shipping point; less than 1000 lb, add 15.00; 99 + % hydrogen reduced, $5.00. Treated ingot, $6.70.

Zinc: Prime Western, 14.00; brass special, 14.25; intermediate, 14.00, East St. Louis, freight allowed over 0.50 per pound. High grade, 14.85; special high grade, 15.25 deld. Diecasting alloy ingot No. 3, 15.00; No. 2, 19.00; No. 5, 15.50, deld.

Zirconium: Ingots, commercial grade, $14.40 per lb; low-hafnium reactor grade, $23.07. Sponge, commercial grade, $10.00 per lb; reactor grade, $14.00-$22.00 per lb, depending on quantity. Powder, electronics grade, $15 per lb; flash grade, $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 26.50-30.25; No. 12 foundry alloy (No. 2 grade), 25.00-25.50; 95 silicon alloy, 0.60 Cu max, 27.00-27.50; 13 alloy, 0.60 cu max, 27.00-27.50; 195 alloy, 27.50-27.75; 108 alloy, 25.50. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 25.25; grade 2, 24.50; grade 3, 23.75; grade 4, 23.25.

Brass Ingot: Red brass, No. 115, 37.55; tin bronze, No. 225, 48.00; No. 245, 43.50; high-leaded tin bronze, No. 305, 41.00; No. 1 yellow, No. 405, 29.75; manganese bronze, No. 421, 33.00.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.50; AZ91C, 37.50; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nominal 1.9% Be alloy) Strip, $1.86-$1.91, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.88, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 45.35¢; l.c.l., 45.98. Weatherproof, 30,000-lb lots, 43.78; l.c.l., 44.53. Magnet wire deld., 15,000 lb or more, 52.68; l.c.l., 53.43.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets, full rolls, 140 sq ft or more, $21.50 per cwt; pipe, full coils, $21.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheet and strip, $12.10-$13.00; sheared mill plate, $10.50-$12.00; wire, $9.50-$11.50; forging billets, $7.25-$7.50; hot-rolled and forged bars, $7.50-$7.80.

ZINC

(Prices per lb, c.l., f.o.b. mill) Sheets, 24.00; ribbon zinc in coils, 21.50; plates, 20.00.

ZIRCONIUM

Plate, $20.25; H.R. strip, $23.95; C.R. strip, $32.00; forged or H.R. bars, $15.40; wire, 0.015 in., 8.00a per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets C.R.	113	97	118
Strip, C.R.	111	99	123
Plate, H.R.	107	98	111
Rod, Shapes, H.R.	94	80	99
Seamless Tubes	144	130	190

ALUMINUM

Screw Machine Stock: 30,000 lb base.

Diam.(in.)or across flats	—Round— 2011-T3	2017-T4	—Hexagonal— 2011-T3	2017-T4
Drawn				
0.125	74.30	71.50	....	....
0.156-0.172	63.00	60.40	....	....
0.188	63.00	60.40	....	76.40
0.219-0.234	59.70	57.20	....	....
0.250-0.281	59.70	57.20	....	73.00
0.313	59.70	57.20	....	69.60
0.344	58.50	....	....	....
Cold-finished				
0.375-0.547	58.50	57.50	70.10	65.50
0.563-0.688	58.50	57.50	66.70	61.60
0.750-1.000	57.40	56.00	61.00	58.10
1.063	57.40	56.00	....	56.10
1.125-1.500	55.20	53.90	59.00	56.10
Rolled				
1.563	53.70	52.40	....	....
1.625-2.000	52.10	51.60	....	....
2.125-2.500	51.70	50.30	....	....
2.563-3.375	50.20	48.70	....	....

ALUMINUM (continued)

Sheets and Circles: 1100 and 3003 mill finish (30,000 lb base; freight allowed)

Thickness Range, Inches	Flat Sheet	Coiled Sheet
0.249-0.136	40.90-45.40	....
0.135-0.096	41.40-46.50	37.70-39.60
0.095-0.077	42.10-48.30	37.80-39.50
0.076-0.061	42.70-50.60	38.20-40.50
0.060-0.048	43.40-52.90	38.80-41.50
0.047-0.038	43.90-55.60	39.60-42.90
0.037-0.030	44.30-58.00	40.40-44.70
0.029-0.024	44.90-52.40	41.00
0.023-0.019	45.80-52.20	42.00
0.018-0.017	46.60-53.30	42.60
0.016-0.015	47.50-53.90	43.40
0.014	48.50-50.90	44.40
0.013-0.012	49.70-52.10	45.10
0.011	50.70-53.70	46.30
0.010-0.0095	52.10-54.40	47.60
0.009-0.0085	53.40	49.10
0.008-0.0075	55.00	50.03
0.007	56.50	51.80
0.006	58.10	53.20

Plates and Circles: Thickness 0.250-3 in. 24-60 in. width or diam, 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	40.2	44.8
5050-F	41.3	45.9
5004-F	42.3	47.5
5052-F	42.9	48.2
6061-T6	44.4	50.0
2024-T4*	48.1	54.4
7075-T6*	55.4	62.8

*24-48 in. widths or diam, 72-180 lengths.

Forging Stock: Round, Class 1, 43.30-55.90 in specific lengths 36-144 in., diameters 0.375-8 in. Rectangles and squares, Class 1, 48.10-63.20 in random lengths, 0.375-4 in. thick, width 0.750-10 in.

Pipe: ASA schedule 40, alloy 6063-T6, standard lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size(in.)		Nom. Pipe Size(in.)	
⅜	$18.45	2	$ 57.00
1	29.00	4	157.20
1¼	39.25	6	281.65
1½	46.95	8	423.80

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
9-11	45.90-47.50	61.50-65.80
12-14	46.20-47.70	62.20-66.80
15-17	46.40-48.30	63.50-68.50
18-20	47.00-48.80	65.50-71.10

MAGNESIUM

Sheet and Plate: AZ31B standard grade, 0.25 in., 103.10; 0.81 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.0 in., 67.90. AZ31B spec. grade, .032 in., 171.30; .081 in., 108.70; .125 in., 98.10; .188 in., 95.70; .250-2.0, 93.30. Tread plate, .188 in., 71.70; .250-2.0 in., 70.60. Tooling plate, .250-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	69.60-72.40	84.60-87.40
12-14	70.70-73.00	85.70-88.00
24-26	75.60-76.30	90.60-91.30
36-38	89.20-90.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots) **Aluminum:** 1100 clippings, 16.50-17.00; old sheets, 13.00-13.50; borings and turnings, 7.50-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	61.63b	58.84c	....	61.82	36.000	34.000	35.250
Yellow Brass	52.10	42.65d	53.64	55.01	27.250	27.000	25.125
Low Brass, 80%	55.85	55.79	54.39	58.68	30.625	30.375	29.875
Red Brass, 85%	57.10	57.13	57.73	60.09	31.875	31.625	31,125
Com. Bronze, 90%	59.06	59.02	59.62	61.64	33.125	32.875	32.375
Manganese Bronze	59.46	53.56	62.80	....	25.250	25.000	24.500
Muntz Bronze	53.84	49.65	....	....	25.625	25.375	24.875
Naval Brass	55.72	50.06	62.75	58.85	25.250	25.000	24.500
Silicon Bronze	65.23	64.41	65.26	67.26e	35.000	34.750	34.000
Nickel Silver, 10%	67.76	70.09g	70.09	....	32.750	32.500	16.375
Phos. Bronze, A, 5%	79.56	80.06	81.26	86.25	36.250	36.000	35.000

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded

8.00; crankcases, 13.00-13.50; industrial castings, 13.00-13.50.

Copper and Brass: No. 1 heavy copper and wire, 28.75-29.25; No. 2 heavy copper and wire, 27.75-28.25; light copper, 24.75-25.25; No. 1 composition red brass, 24.75-25.75; No. 1 composition turnings, 23.75-24.75; yellow brass turnings, 14.50-15.00; new brass clippings, 23.00-23.50; light brass, 14.50-15.00; heavy yellow brass, 16.50-17.00; new brass rod ends, 21.00-21.50; auto radiators, unsweated, 18.50-19.50; cocks and faucets, 18.50-19.50; brass pipe, 20.50-21.00.

Lead: Heavy, 12.50-13.00; battery plates, 7.00-7.25; linotype and stereotype, 13.50-14.00; electrotype, 12.50-13.00; mixed babbitt, 13.50-14.00.

Monel: Clippings, 80.00-90.00; old sheets, 70.00-80.00; turnings, 70.00-80.00; rods, 80.00-90.00.

Nickel: Sheets and clips, 130.00-195.00; rolled anodes, 130.00-195.00; turnings, 110.00-165.00; rod ends, 130.00-195.00.

Zinc: Old zinc, 4.50-5.50; new die-cast scrap, 4.00-4.50; old die-cast scrap, 2.50-3.00.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 20.00; 3003 clippings, 19.75-20.00; 6151 clippings, 19.75-20.00; 5052 clippings, 19.75-20.00; 2014 clippings, 19.00-19.50; 2017 clippings, 19.00-19.50; 2024 clippings, 19.00-19.50; mixed clippings, 18.50-19.00; old sheets, 17.00-17.50; old cast, 17.00-17.50; clean old cable (free of steel), 18.75-20.00; borings and turnings, 16.50-18.50.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 62.00; light scrap, 57.00; turnings and borings, 42.00.

Copper and Brass: No. 1 heavy copper and wire, 33.00; No. 2 heavy copper and wire, 31.50; light copper, 29.25; refinery brass (60% copper) per dry copper content, 30.75.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 heavy copper and wire, 33.00; No. 2 heavy copper and wire, 31.50; light copper, 29.25; No. 1 composition borings, 29.00; No. 1 composition solids, 29.50; heavy yellow brass solids, 20.50; yellow brass turnings, 19.50; radiators, 22.50.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 58.29; oval, 57.54, 5000-10,000 lb; electrodeposited, 50.28; 2000-5000 lb lots; cast, 52.54, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, $1.015; 10-499 lb, 99.50; 500-4999 lb, 95.50; 5000-29,999 lb, 93.50; 30,000 lb, 91.50. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, $1.215; 200-499 lb, $1.200; 500-999 lb, $1.195; 1000 lb or more, $1.190.

Zinc: Balls, 21.00; flat tops, 21.00; flats, 22.75; ovals, 22.00, ton lots.

CHEMICALS

Cadmium Oxide: $1.70 per lb, in 100-lb drums.

Chromic Acid: Less than 10,000 lb, 30.25, over 10,000 lb, 29.50.

Copper Cyanide: 100-1000 lb, 80.50.

Copper Sulphate: 500-1900 lb, 21.15; 2000 lb and over, 18.65.

Nickel Chloride: 100 lb, 46.50; 200 lb, 44.50; 300 lb, 43.50; 400-4900 lb, 41.50; 5000-9900 lb, 39.50; 10,000 lb and over, 38.50. Prices eastern delivery.

Nickel Sulphate: 100 lb, 38.25; 200 lb, 36.25; 300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 31.25; 36,000 lb, 30.25. Prices eastern delivery.

Sodium Cyanide: Egg, under 1000 lb, 19.80; 1000-19,900 lb, 18.80; 20,000 lb and over, 17.80; granular, add 1-cent premium to above.

Sodium Stannate: Less than 100 lb, 72.80; 100-699 lb, 64.30; 700-1900 lb, 61.80; 2000-9900 lb, 60.10; 10,000 lb or more, 58.90.

Stannous Chloride (anhydrous): Less than 25 lb, $1.702; 25 lb, $1.352; 100 lb, $1.202; 400 lb, $1.177; 5200-19,600 lb, $1.055; 20,000 lb or more, 93.30.

Stannous Sulphate: Less than 50 lb, $1.327; 50 lb, $1.027; 100-1900 lb, $1.007; 2000 lb or more, 96.70.

Zinc Cyanide: Under 1000 lb, 55.55; 1000 lb and over, 53.55.

(*Concluded from page 155*)

scrap are $2 a ton lower than they were a week ago, giving rise to speculation whether the readjustment in the market has come to an end. Also supporting this view: Some brokers are out of the market.

The $2 drop of the past week came in two acquisitions by a leading steel company, each at $1 a ton less than the preceding purchase.

Mills have good inventories of scrap, but they also are consuming it at a near record rate, with steelmaking operations exceeding 100 per cent of capacity.

Cleveland—The purchase of a tonnage of No. 1 heavy melting steel by a local mill at $63.50, delivered, unchanged from the most recent buy, serves to support the market just when signs of easiness were appearing. The fact that automotive lists brought $1 to $2 less per ton at the end of last month was somewhat unsettling, being reflected in the Valley where No. 1 steel sold off $1 at $64-$65. In general, the market tone is easier.

Cincinnati—No. 1 heavy melting steel is quoted off $1 here to $56-$57. No. 2 heavy melting is down $1 and No. 2 bundles are off $2. Cast iron grades are unchanged.

Detroit — The scrap market is quiet. Prices are unchanged. At the end of last month automotive lists were slightly lower than they were at the end of August. The improved flow of scrap coming through may weaken the market.

FROM STOCK
IMMEDIATE SHIPMENT
STRUCTURAL WIDE FLANGE BEAMS ASTM-A-7
400 TONS 10" x 5¾" x 21# x 40'
200 TONS 12" x 6⅛" x 27# x 40'
PRICE: **$12.60** per cwt., net
All Extras Included
FOR QUICK ACTION
WRITE OR WIRE
Box 476, STEEL
Penton Bldg. Cleveland 13, Ohio

WANT TO BUY
STEEL BY-PRODUCT DISCS
2" To 2¼" DIAMETER .060 TO .125
4⅛" DIAMETER .060 TO .125
6⅛" TO 10" DIAMETER .060 TO .125
11⅛" OR 12⅜" DIAMETER .085 TO .090
HOT OR COLD ROLLED
CONTACT PURCHASING DEPARTMENT
KEYSTONE LAMP MFG. CORP.
SLATINGTON, PA.,
PHONE: SLATINGTON P. O. 7-3831

WANT TO BUY SMALL TOOL AND DIE SHOP EQUIPMENT TO PUT IN PLANT OF GOING CONCERN. ALSO WOULD WANT EXPERIENCED MAN TO OPERATE.
REPLY BOX 470, STEEL
PENTON BLDG. CLEVELAND 13, OHIO

WANTED
Single and Multiple
Spindle Wire Drawing Blocks
NORTHEASTERN STEEL CORP.
837 Seaview Avenue
Bridgeport 7, Conn.

FOR SALE
CRANE
Shepard Niles 10-5 T Overhead Crane, floor controlled, 39'9" span, 3-440-60 A.C. Like new, in operation.
Phone St. Joseph, Michigan
Garden 9-3263

CLASSIFIED

Help Wanted

METALLURGIST
Young Metallurgist wanted by Detroit area steel mill producing stainless and alloy steels to follow special problems in Bar Mills. Steel Mill experience desirable. Salary approximately $7500 per year. Reply Box 474, STEEL, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

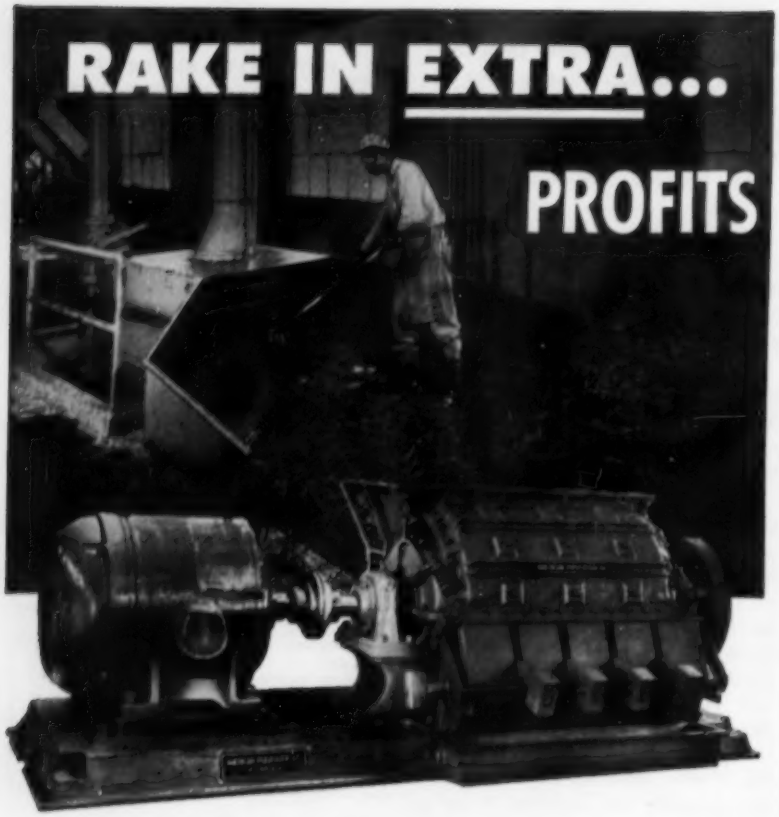
REPRESENTATIVE, WITH 16 YEARS EXPERIENCE in the successful sale of steel tubing seeking connection with tube manufacturer. Reply Box 473, STEEL, Penton Bldg., Cleveland 13, Ohio.

EXPERIENCED STAINLESS SPECIALIST TO represent company in Wisconsin and adjacent territory. Mill and/or warehouse. Excellent general line background. Wide acquaintance and best references. Reply to Box 477, STEEL, Penton Bldg., Cleveland 13, Ohio.

MELTING SUPERINTENDENT

Southern California steel mill has a position open for a Melting Superintendent of an electric furnace Melt Shop making predominantly mild steel. The position is with a progressive and growing firm providing a good insurance program and other employee benefits and offering a salary commensurate with ability and experience. Applicants must have proven technical and supervisory experience. Please write, giving details of work history, personal data and salary requirements to Box 471, STEEL, Penton Bldg., Cleveland 13, Ohio.

WE CAN HELP YOU TO CONTACT high caliber men to fill specific jobs you have in mind—
Readers of STEEL include men of wide training and experience in the various branches of the metalworking industry. When you have an opportunity to offer, use the Help Wanted columns of STEEL.



CONVERT YOUR MACHINE TURNINGS INTO HIGHER MARKET VALUE With...

American METAL TURNINGS CRUSHER

NOW PRODUCING SHOVELING CHIPS FOR SCORES OF AMERICA'S BLUE CHIP COMPANIES

- $3 to $4 More Per Ton for Chips than for long machine shop turnings.
- Up to 50 Gallons Cutting Oil Recovery Per Ton.
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CUSTOM BUILT HOPPERS TO FIT YOUR INSTALLATION

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American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1539 MACKLIND AVE. • ST. LOUIS 10, MO.

Seattle—Scrap continues active, with prices firm. No. 1 and No. 2 heavy melting are quoted at $40 and $46. Mill inventories are comfortable, equal to about 60-day supplies. Receipts are satisfactory, but there is no surplus. Mills are buying in step with their requirements. Export demand continues active. Japan is an eager buyer of all tonnage offered.

Buffalo — Firmness is reported in the local market, but dealers are said to be offering material $2 under recently established prices. A test will come around mid-month when new mill orders are expected. Some dealers look for a decline in prices. Dealers are shipping against old orders. Supplies remain light giving strong support to the current level of prices.

Birmingham — Export prices have risen to where they are attracting scrap from the more distant interior sources in this district. Movement to northern mills has slowed down despite the high prices offered.

Domestic consumers continue out of the market, and dealers are cutting No. 2 heavy melting scrap into 2 and 3-ft lengths for electric furnace and foundry steel, in big demand at prices $10 or more a ton above the open-hearth grades.

The cast iron market continues strong. Dealers are unable to build stockpiles despite larger receipts.

St. Louis—The undertone of the market is easier, with cast iron prices spotty. Trading in cast the past week was almost negligible. Other grades are moving well, with considerable tonnage available. The only strong spot is re-rolling rails, which are quoted up $2 to $90. High steel operations give assurance of continued heavy demand. Granite City Steel Co., for example, is committed full for remainder of this year on the various products it produces.

San Francisco — No. 1 heavy melting steel scrap has been advanced $2 a ton, while No. 2 heavy melting and No. 2 bundles are up $1. Other grades hold unchanged. With heavy tonnage moving in the export market the undertone is strong.

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Now, more than ever, you can depend on

HANNA

as your best source for

PIG IRON

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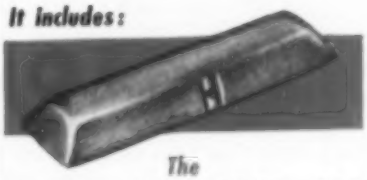
- *Our product range is greater than ever*

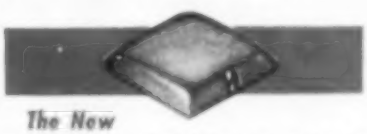
It includes:



The

HANNA 38-POUND PIG

The foundryman's favorite standard pig. Available in all grades, silvery and HannaTite. A good example of the quality that has made Hanna "the best known name in iron."



The New

EXCLUSIVE HANNATEN INGOT

For 10-lb.-pig users, this new ingot means no free-carbon pockets, finer grain structure, more even melting. Available in all grades, silvery and HannaTite — an extra-close-grain iron.

THE HANNA FURNACE CORPORATION

Buffalo • Detroit • New York • Philadelphia

Merchant Pig Iron Division of

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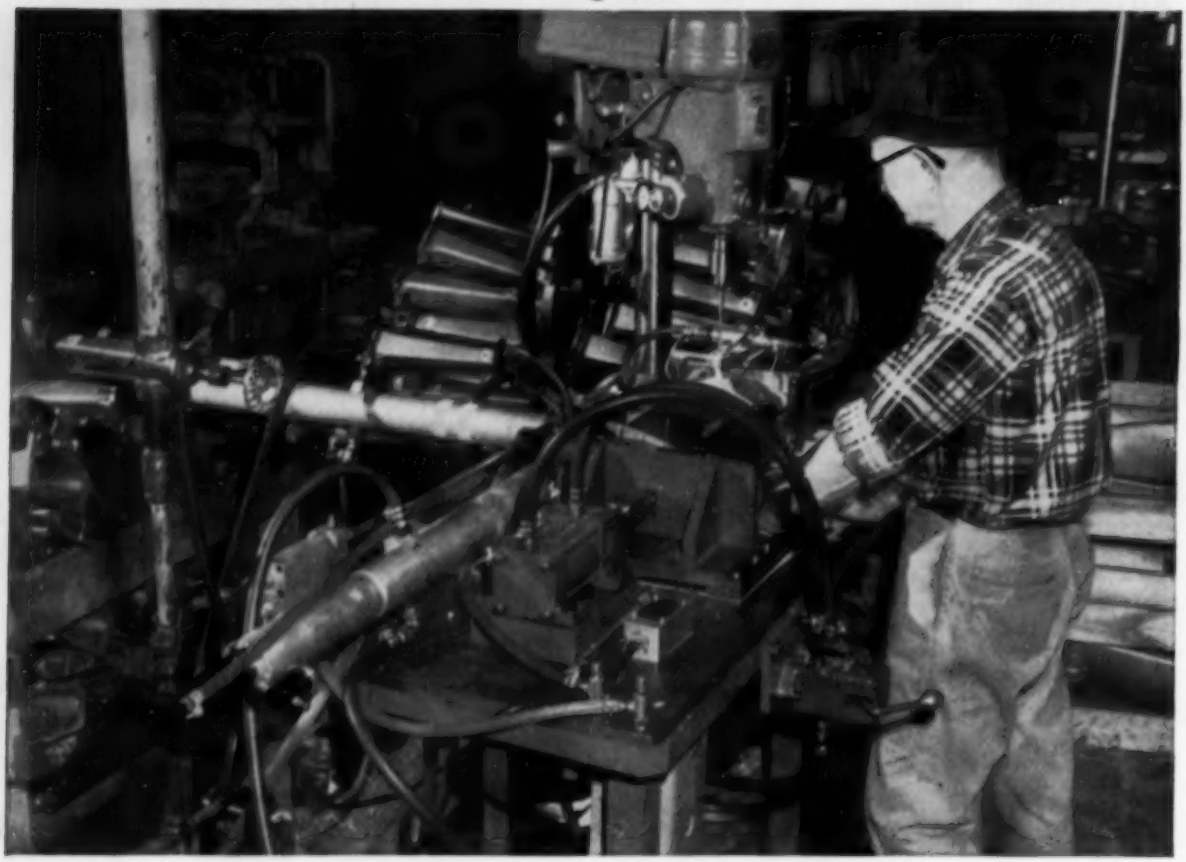
Gardner-Denver... Serving the World's Basic Industries

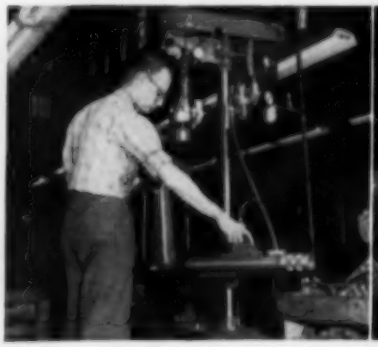


At this drill press station, four Keller Tool "Airfeedrills," with five-, six- and eight-inch strokes, drill four extra holes in the workpiece as the drill press finishes one hole from above.

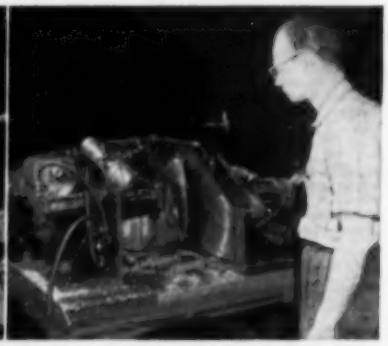
Drills 4 extra holes . . . production time: zero!

Production men have found a new and ingenious way to complete drilling operations with no extra production time. When a workpiece has to be jigged or put in a drill press for some operation, they mount Keller Tool "Airfeedrills"® in position to perform additional drilling, reaming, tapping or facing operations at the same time. The illustrations on this page show how it's done.

Ideal for mounting in multiple units or as single outriggers, Keller Tool "Airfeedrills" and "Airfeedtappers"® perform complete work cycles automatically—at the press of a button. Further details are available in Bulletin 92.



Operator presses a button—and the Keller Tool "Airfeedtapper" provides a free tapped hole while standard machine taps three holes at top of piece.



While special multiple head unit drills eight holes in the work, an "Airfeedrill" mounted at rear of fixture step drills a "free" ¼-⅝-inch hole at an odd angle.

GARDNER-DENVER

KELLER TOOL division, Grand Haven, Michigan

THE QUALITY LEADER IN COMPRESSORS, PUMPS, ROCK DRILLS AND AIR TOOLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

The handwriting is on the wall . . .

Eventually all major annealing departments will be composed entirely of Single Stack Furnaces

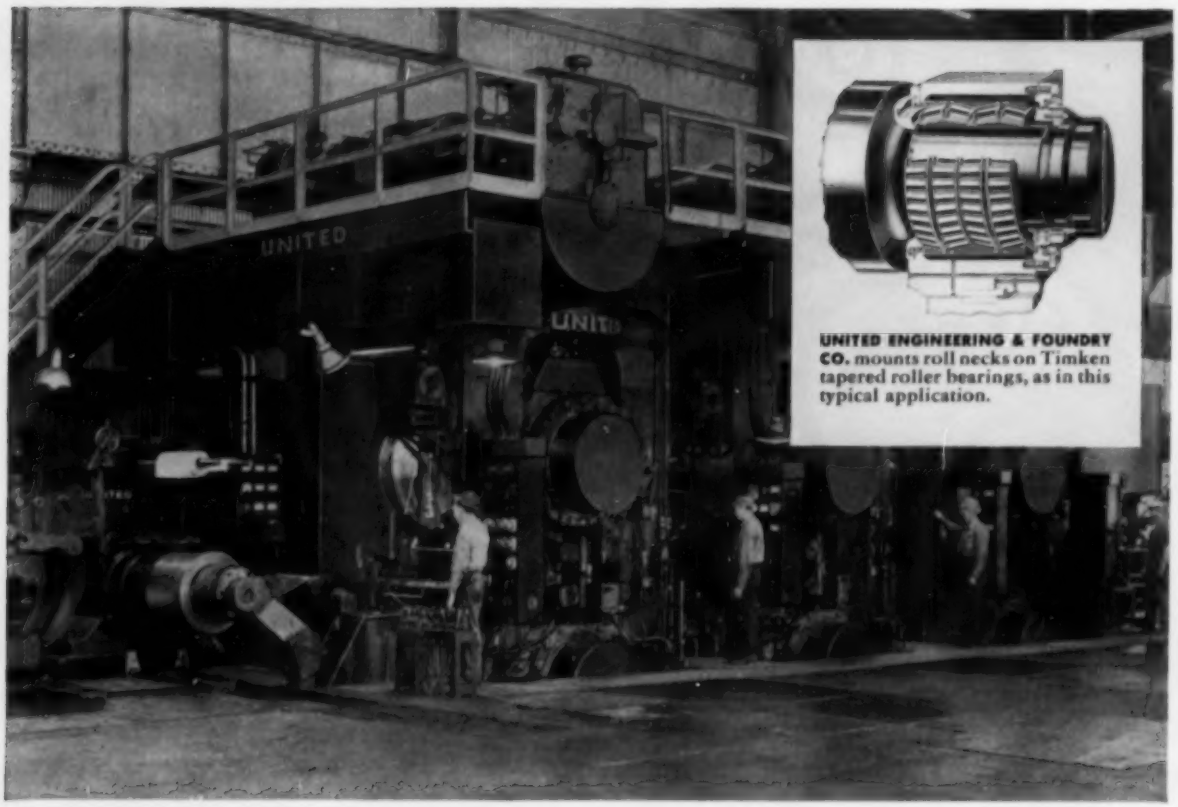
. . . And most of them will be made by

Lee Wilson ENGINEERING COMPANY, INC.
30005 WEST LAKE ROAD ★ CLEVELAND 16, OHIO

SINGLE-STACK RADIANT TUBE ANNEALING FURNACES
MAKE THE BEST METALS BETTER

★ ORIGINATORS AND LEADING PRODUCERS OF SINGLE-STACK RADIANT TUBE FURNACES

Crucible Steel gets lower bearing cost per ton...less scrap loss per coil with roll necks on TIMKEN® bearings



UNITED ENGINEERING & FOUNDRY CO. mounts roll necks on Timken tapered roller bearings, as in this typical application.

UNITED ENGINEERING built this 3-stand tandem cold mill for Crucible Steel. Back-up rolls and work rolls are mounted on Timken® tapered roller bearings. By holding rolls rigid, Timken bearings assure "on-gauge" operation, cut costly scrap loss. And the long life of Timken bearings keeps bearing cost per ton of steel rolled to a minimum.

Tapered construction lets Timken bearings take radial and thrust loads. No extra thrust devices are needed. Chuck mountings are simpler, more compact. Timken bearings hold shafts, housings concentric — make closures more effective, with less lubricant leakage. Grease-lubricated Timken bearings require no tubes, pipes or reservoirs, reduce lubrication system maintenance costs. And rolls can be changed faster.

Geometrically designed and precision-made to give true rolling motion, Timken bearings permit easier acceleration, easier driving, which means a saving on power, reduced skidding and scuffing between rolls. Maintenance and repair costs are cut. Mills using balanced proportion Timken bearings increase roll neck strength up to 60% — load ratings up to 40%. The balanced proportion design permits large diameter roll necks without increasing bearing O.D., provides maximum capacity in less space.

Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN *TAPERED ROLLER BEARINGS ROLL THE LOAD*

TRADE-MARK REG. U. S. PAT. OFF.